THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LV. No. 1405.] LONDON, APRIL 15, 1890. [42ND YEAR. Price 6d.

WOLSTON'S Paste and Ready Mixed for Use.

Guaranteed Free from Adulteration. **TORBAY PAINTS.**

FOR GASHOLDERS, &c., &c.

The Original "Torbay Paints"

As supplied during many years to the LONDON GASLIGHT & COKE COMPANY.

Illustrated Price List Post Free.

TORBAY & DART PAINT Co., Ld.,

23, Gt. George St., Westminster, S.W.

DARTMOUTH, & BRIXHAM (TORBAY).

— ESTABLISHED 1830. —

PARKER & LESTER,

Manufacturers & Contractors.

THE ONLY MAKERS OF

PATENT ANTIMONY PAINT,

Parker's Imperial Black Varnish,

Oxide Paints, Oils, and General Stores for Gas and Water Works.

WORKS:

ORMSIDE STREET, OLD KENT ROAD, LONDON.

Ashmore, Benson, Pease, & Co., Ld.,

STOCKTON-ON-TEES,

Manufacturing Gas Engineers.

See Advertisement, p. 632.

CEMENT

EARLE'S

BEST

Portland Cement

MANUFACTURED BY

GEO. & THOS. EARLE,

HULL.

Office: 7, PIER STREET.

Works: WILMINGTON.

STOREAGE CAPACITY 10,000 Tons.

ESTABLISHED 1811—OVER THREE QUARTERS OF A CENTURY

Telegraphic Address: "CEMENT HULL."

NORTON'S PATENT

"ABYSSINIAN" & ARTESIAN TUBE WELLS,

FOR TOWN WATER-WORKS AND OTHER SUPPLIES.

The following Town Water-Works Supplies have been obtained by this System, viz.:—Abbott's Langley, Aldershot, Alnwick, Cirencester, Hertford, Lechlade, St. Albans, Shrewsbury, Skegness, Southampton, Stony Stratford, Swansea, Wallingford, Watford, West Worthing, Wimborne, &c.

LE GRAND & SUTCLIFF,

HYDRAULIC ENGINEERS, 100, BUNHILL ROW, LONDON, E.C.

FUEL ECONOMY.

MELDRUM'S PATENT FURNACES

RAISE STEAM BY BURNING

BREEZE, COAL DUST,

AND OTHER SMALL AND POOR FUEL.

Telegrams: "Meldrum Manchester."

REALIZED SAVING UP TO

Results Guaranteed.

£200

PER BOILER PER ANNUM.

MELDRUM BROTHERS,

26, HALF STREET, CATHEDRAL YARD, MANCHESTER.

DANIEL HOWARD,

(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER & BOILER WORKS,

WEST BROMWICH, NEAR BIRMINGHAM

(ESTABLISHED 1765).

MANUFACTURER OF TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST IRON TANKS FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, and all kinds of GAS APPARATUS,

Wrought-Iron Roofs, Bridges, Girders, &c.,

Steam, Hot Water, and Range Boilers, Tanks, Cisterns, Boats, and all kinds of Wrought-Iron Work.

DRAWINGS, SPECIFICATIONS, AND ESTIMATES SUPPLIED ON APPLICATION.

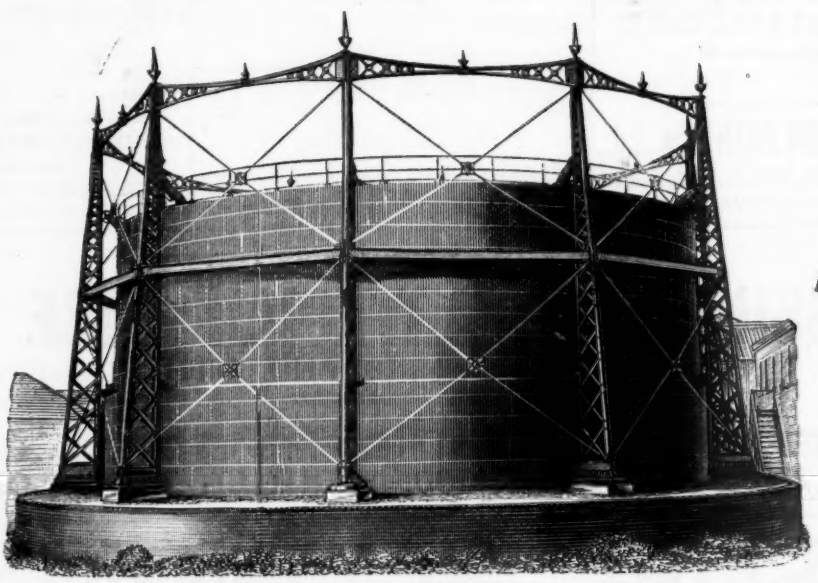
TELEGRAPHIC ADDRESS: "COCKEY'S FROME."

EDWARD COCKEY & SONS, Ld.,

ESTABLISHED OVER HALF A CENTURY.

Gas Engineers, Ironfounders, & Contractors,

Manufacturers of *GASHOLDERS and TANKS, BOILERS and ENGINES, ROOFS, EXHAUSTERS, BREEZE SCREENS, CHARGING and COKE BARROWS.*



Manufacturers of *PATENT WASHERS, PATENT VALVES for PURIFIERS, &c., GOVERNORS, LAMP COLUMNS, Weighbridges, COKE BREAKERS.*

SOLE MAKERS OF COCKEY AND SMITH'S PATENT SELF-ACTING BYE-PASS VALVES.

Estimates for any description of Gas Plant on application.

THE IRON-WORKS, FROME SELWOOD, SOMERSET.

HIGHEST AWARDS—LONDON, PARIS, COLOGNE, VIENNA, MELBOURNE, AND OTHERS.

—11 MEDALS.—

MANUFACTURERS OF TUBES AND FITTINGS OF EVERY DESCRIPTION.

WROUGHT-IRON OR STEEL MAINS UP TO 6 FEET DIAMETER, FOR GAS, WATER, OIL, OR OTHER PURPOSES.

SCREWING TACKLE, BOILER MOUNTINGS, VALVES, COCKS, ETC.

LONDON: 108, Southwark Street. BIRMINGHAM: 114, Colmore Row. LEEDS: 6, Mark Lane, New Briggate.

THOMAS PIGGOTT & CO.,

(ESTABLISHED 1822)

SPRING HILL, BIRMINGHAM,

MANUFACTURERS OF

GAS APPARATUS

OF EVERY DESCRIPTION

INCLUDING

GASHOLDERS

and Tanks,

Retorts, Purifiers,

Valves, Scrubbers,

Condensers,

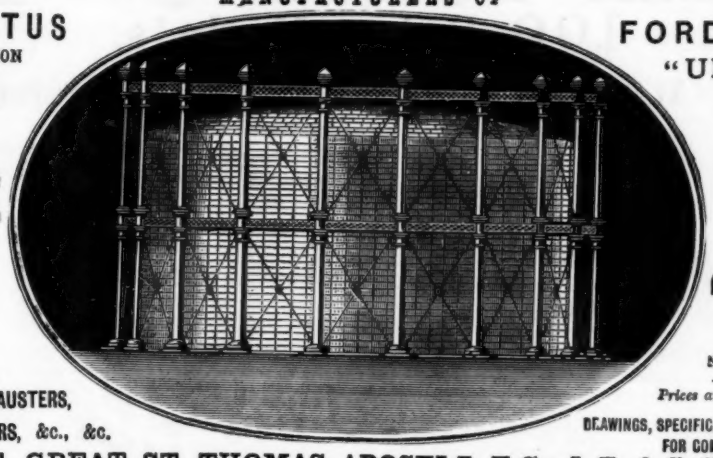
ETC., ETC.

All of the most approved Designs.

BOILERS, ENGINES, PUMPS,

BEALE'S and other EXHAUSTERS,

METERS, GAUGES, GOVERNORS, &c., &c.



FORD'S PATENT

"UNIVERSAL"

SCRUBBER-

WASHER.

Numbers at work, giving excellent results.

No Motive Power Required.

ALSO OF

SOMERVILLE'S PATENT

RETORT MOUTHPIECES

AND

SELF-SEALING LIDS.

NO LUTING REQUIRED.

Prices and Particulars on application.

DRAWINGS, SPECIFICATIONS, AND ESTIMATES PREPARED FOR COMPLETE GAS PLANT.

London Offices: 14, GREAT ST. THOMAS APOSTLE, E.C.—J. E. & S. SPENCER, Agents.

ESTABLISHED 1825.

GAS TUBES

MANUFACTURERS OF EVERY DESCRIPTION OF

IRON OR STEEL LAP-WELDED OR BUTT-WELDED TUBES

FOR ANY PURPOSE.

NEWTON, CHAMBERS, & CO., LIMITED,

THORNCLIFFE IRON-WORKS, near SHEFFIELD,

MANUFACTURERS OF

SLIDE VALVES,

WITH RACK & PINION,

OR

Internal or External SCREWS, of all Sizes.

GASHOLDERS,

AND

Gasholder Tanks.

CAST-IRON RETORTS,

RETORT-BED FITTINGS,

And Retort-House Appliances

of every description.

Iron Roofs, Columns, Girders, Floor Plates and Tools, &c.

WROUGHT AND CAST IRON

CONDENSERS,

SCRUBBERS, & WASHERS,

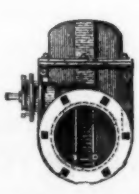
TAR AND LIQUOR PUMPS, &c.

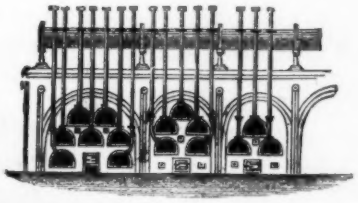
PATENT

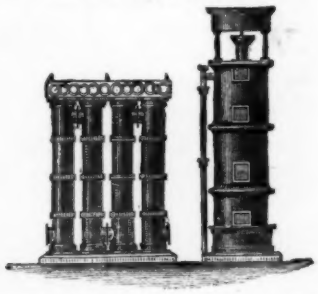
CENTRE VALVES

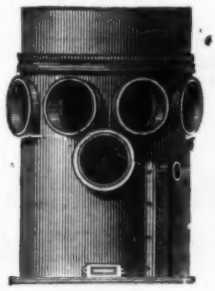
for working Purifiers.

Also Bye-Pass & Stop Valves.







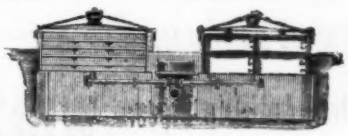


PURIFIERS with Planed Joints,

HAND and HYDRAULIC LIFTING GEAR, CAST-IRON MAINS and SPECIALS.

WOOD GRIDS.

CAST AND WROUGHT IRON TANKS AND CISTERNS.



DESIGNS, SPECIFICATIONS, AND ESTIMATES FREE.

Pig Iron (*Special Quality*) for ENGINE CYLINDERS, &c.

GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

CROSSLEY'S "OTTO" GAS-ENGINE.

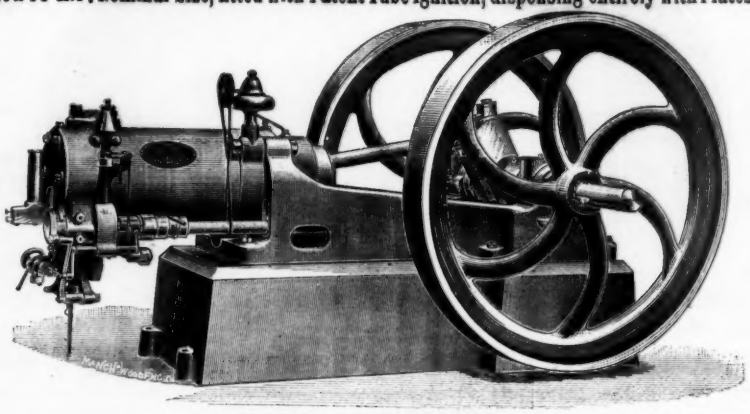
100 Prize Medals.

MADE in SIZES
2-Man to 100-HP.

GAS-ENGINES
COMBINED
WITH
PUMPS
FOR
TOWNS SUPPLY,
SEWAGE, &c., &c.

GAS-ENGINES
COMBINED
WITH
AIR COMPRESSORS
FOR THE
SHONE SEWAGE
SYSTEM, LUCIGEN
LIGHT, &c.

New 14-H.P. Nominal Size, fitted with Patent Tube Ignition, dispensing entirely with Plates.



MADE in SIZES
2-Man to 100-HP.

VERTICAL
AND
HORIZONTAL
TYPES.

ENGINES
COMBINED
WITH
HOISTS, PUMPS,
DYNAMOS, &c. &c.

Largely used for
EXHAUSTING,
PUMPING,
COKE CRUSHING,
ELECTRIC LIGHTING,
&c., &c.

Over **31,000** "OTTO" ENGINES are at work.

CROSSLEY BROS., LTD., OPENSHAW, MANCHESTER,

LONDON,
LIVERPOOL,
GLASGOW,
NEWCASTLE,
BIRMINGHAM,
HULL.

HARRIS & PEARSON,
STOURBRIDGE, ENGLAND.
MANUFACTURERS OF
FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.
GLAZED BRICKS AND PORCELAIN BATHS.

W. C. HOLMES & CO.,

CONTRACTING GAS ENGINEERS.

SPECIALITIES.

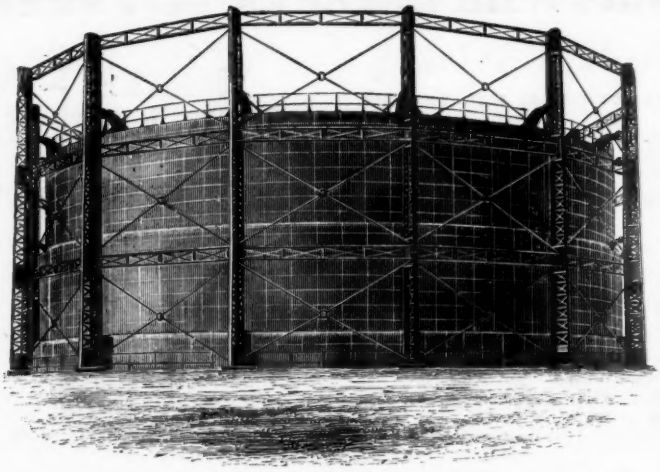
Patent Regenerative Retort-Settings.

Patent Rotary Scrubber-Washer.

Patent Reciprocating Exhauster.

Patent Regulator.

Patent Anti-Dip Pipes.



Treble-Lift Gasholder, 130 ft. by 66 ft., as erected at Burton-on-Trent, 1889.

SOLE MAKERS OF
DRAKE'S
PATENT
GAS PLANT
Specially adapted for Country Places, and for mixing with Coal Gas to increase Illuminating Power.

Condensers, Scrubbers, Purifiers, and all Fittings for Gas-Works.

IMPROVED
CHEMICAL PLANT.

WHITESTONE IRON-WORKS,
HUDDERSFIELD,
AND
80, CANNON STREET, LONDON, E.C.

Telegrams:
"Holmes Huddersfield."
"Ignitor London."

Illustrated Catalogues on application.

JOHN HALL & CO.,

STOURBRIDGE,

MANUFACTURERS OF FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

RETORTS CAREFULLY PACKED FOR SHIPMENT.

A STOCK OF DIFFERENT SHAPES ON HAND.

GAS AND WATER PIPES

AND

CASTINGS OF EVERY DESCRIPTION.

MANUFACTURED BY THE

CLAY CROSS COMPANY,

CHESTERFIELD.

TRADE	TELEGRAMS:	LONDON AGENTS:
C X C	"JACKSON"	BECK & Co.
MARK.	CLAY CROSS.	53, QUEEN VICTORIA ST., E.C.

SULPHATE OF AMMONIA.

By Her Majesty's Royal Letters Patent.

DR. FELDMANN'S APPARATUS

The most successful and approved Apparatus known up to the present time.

FOR REFERENCES, PARTICULARS, TESTIMONIALS, AND PRICES APPLY TO THE

Sole Agents and Manufacturers,

GODDARD, MASSEY, & WARNER,

ENGINEERS,

NOTTINGHAM.

The Apparatus has been supplied to the following Firms—

BURT, BOULTON, & HAYWOOD, SILVERTOWN, and ELING.
CHANCE BROTHERS, OLDBURY (4 Apparatus).
RUNCORN SOAP & ALKALI CO., Limited, RUNCORN.
NETHAM CHEMICAL CO., Limited, BRISTOL.
ANIMAL CHARCOAL CO., Limited, SHADWELL.
WM. BUTLER & CO., BRISTOL.
KEMPSON & CO., Pye Bridge.

And to the following Gas Companies and Corporations:—

ILKESTON.	BURY.	CHORLEY.
WIDNES	BRIGHOUSE.	WHITEHAVEN.
HALIFAX.	MARKET HARBRO'.	CHESTER.
ALTRINCHAM.	PRESCOT.	SOUTH SHIELDS.
DENTON.	SOWERBY BRIDGE.	LEEK.
ST. ALBANS.	LEICESTER.	IPSWICH.
DUKINFIELD.	DARWEN.	BOURNEMOUTH.
NORTHWICH.	NELSON.	SALFORD.
HUDDERSFIELD.	ORMSKIRK.	LUTON.
		HAMPTON COURT.

CUTLER'S PATENT
SPIRAL GUIDE-FRAMING
FOR GASHOLDERS.

STRONG. SAFE. CHEAP.

MOST ADVANTAGEOUS DISPOSITION OF MATERIAL.

Economical both in Manufacture and Erection; and by avoiding the necessity for large Piers, permitting considerable Economy in the Construction of the Tank.

FULL PARTICULARS FROM THE PATENTEES,

MESSRS. S. CUTLER & SONS, ENGINEERS,

GREAT GEORGE STREET CHAMBERS,

16, GREAT GEORGE ST., WESTMINSTER, S.W.

WORKS: MILLWALL, LONDON, E.

JOSEPH CLIFF & SONS,

INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.,
WORTLEY, LEEDS.

LONDON Offices & Depôts:
Baltic Wharf, Waterloo Bridge.

WHARVES NOS. 2 & 4, INSIDE G.N.
GOODS YARD, KING'S CROSS, N.

LIVERPOOL:
16, Lightbody Street.

LEEDS:
Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

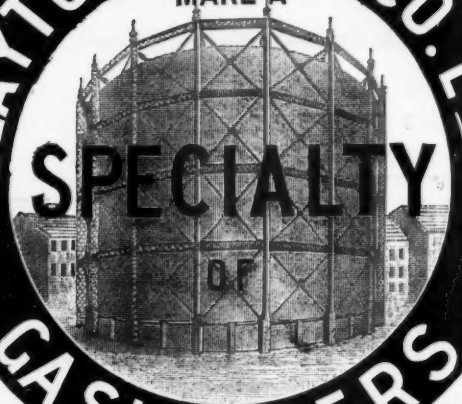
ESTABLISHED MORE THAN A QUARTER OF A CENTURY

WORKS
HUNSLET,
LEEDS

LONDON OFFICE:
60, QUEEN VICTORIA
STREET
E.C.

CLAYTON SON & CO. LTD.

MAKE A



SPECIALTY
OF
GASHOLDERS

AND
MAKERS
OF

REGd TELEGRAPHIC ADDRESS: "GAS LEEDS"

GAS PLANT OF EVERY DESCRIPTION.

JOHN BROWN & CO., LIMITED,

ATLAS STEEL AND IRON WORKS, SHEFFIELD,

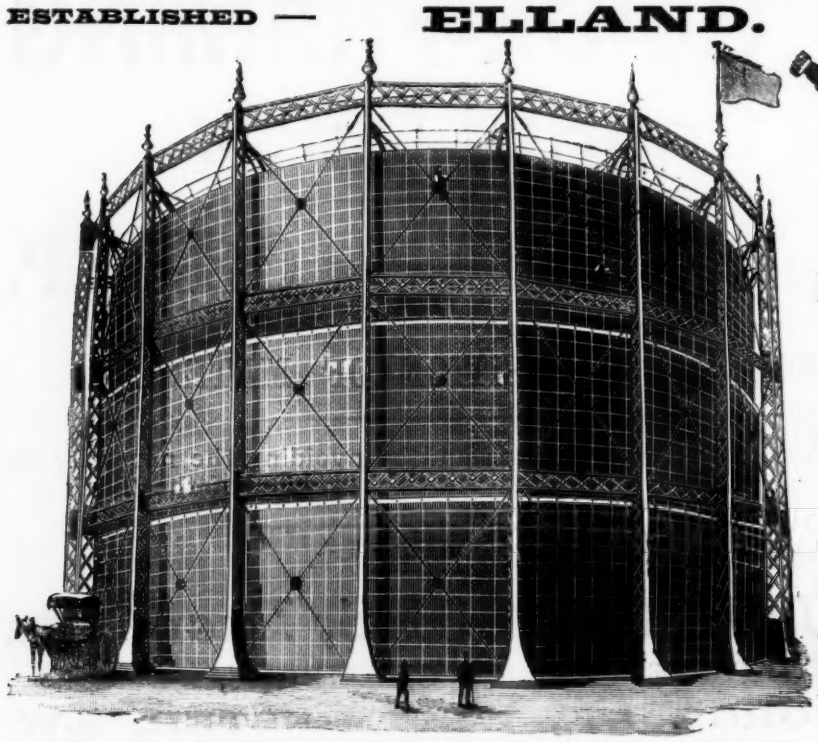
ALDWARKE MAIN GAS COAL.

This Coal yields 12,600 feet of 16-candle gas per ton.
Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.

R. DEMPSTER & SONS, Ltd.,

ROSE MOUNT GAS ENGINEERING WORKS,

ESTABLISHED — ELLAND. — 1855.



The above illustrates a TREBLE-LIFT GASHOLDER, 191, 191, and 188 feet diameter by 35 feet deep each, as made for the MELBOURNE GAS COMPANY.

GAS AND CHEMICAL PLANT OF EVERY DESCRIPTION — ALL SUNDRIES SUPPLIED.

OUR
ROTARY EXHAUSTERS
Are acknowledged to excel in efficiency and finish.

OUR IMPROVED
COKE-BREAKING MACHINE
Is a pronounced success.
See Last Week's Issue.

Designs, Specifications, and Estimates submitted on application to

R. Dempster & Sons, Ltd.,
ELLAND.

KIRKHAM, HULETT, & CHANDLER, Ld.,

PALACE CHAMBERS,

9, BRIDGE ST., WESTMINSTER.

Mr. S. HERSEY, Managing-Director. Mr. J. CHANDLER, Engineer.

THE "NEW" PATENT

"Standard" Washer-Scrubber,

As supplied to and in course of construction for numerous Gas-Works. (*See previous Advertisements.*)

Thoroughly extracts every grain of Ammonia and a large quantity of other Impurities from Gas.

Has been for many months in successful and satisfactory operation at **The Gaslight and Coke Company's Station at BECKTON** (*vide* Testimonial).

The Gaslight and Coke Company, Horseferry Road, Westminster, S.W.,
Nov. 25, 1889.

Messrs. KIRKHAM, HULETT, AND CHANDLER, LTD.,

GENTLEMEN,—In reply to your enquiry respecting the result of putting Wooden "Bundles" into some of the Washer-Scrubbers at our Beckton Station, I beg to say that they have answered admirably for the few months they have been in; and I think them a decided success.—I am, yours truly,

(Signed) G. C. TREWBY.

385 "STANDARD" WASHER-SCRUBBERS, equal to a daily capacity of 337,600,000 cubic feet of Gas, supplied and in course of construction.

The following List comprises Orders received for new "Standard" Washer-Scrubbers fitted with the improved "Wooden Bundles;" and Machines supplied in past years renewed by substituting the same in place of the "Iron Bundles":—

New Washer-Scrubbers.	Capacity in cub. ft. per 24 hours.
LIVERPOOL	3,000,000
LEICESTER	2,250,000
WEST HAM	3,000,000
MELBOURNE	1,500,000
VALPARAISO	600,000
BARRY and CADOXTON	500,000
WORKINGTON	500,000
CHARLOTTENBURG	1,500,000
MAGDEBURG	750,000
ERFURT	400,000
RAWMARSH	200,000
Renewals.	
THE GASLIGHT AND COKE COMPANY—	
BECKTON STATION	1,250,000
" "	2,500,000
NINE ELMS " (in part)	3,000,000
SHOREDITCH " "	2,500,000
PIMLICO " "	2,000,000
SOUTH METROPOLITAN GAS COMPANY—	
VAUXHALL STATION (in part)	3,000,000
BIRMINGHAM "	5,000,000
KINGSTON-ON-HULL	400,000
MELBOURNE	1,500,000
"	1,500,000
CROYDON	1,500,000
MAIDSTONE	1,000,000

385 "STANDARD" WASHER-SCRUBBERS, equal to a daily capacity of 337,600,000 cubic feet of Gas, supplied and in course of construction.

ADDRESS AS ABOVE.

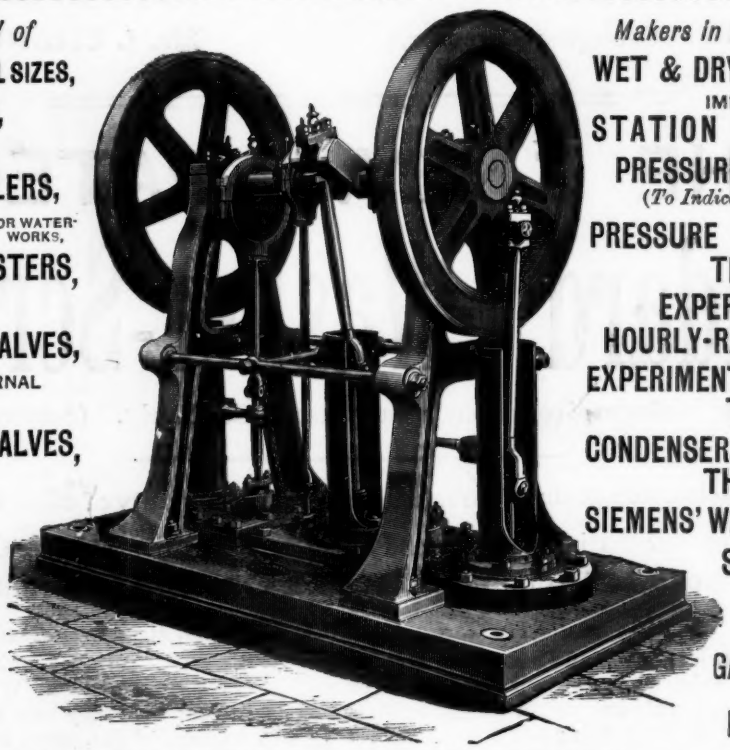
R. LAIDLAW & SON,

GAS AND WATER ENGINEERS.

Manufacturers of **GAS APPARATUS** of every Description.

Makers in GLASGOW of

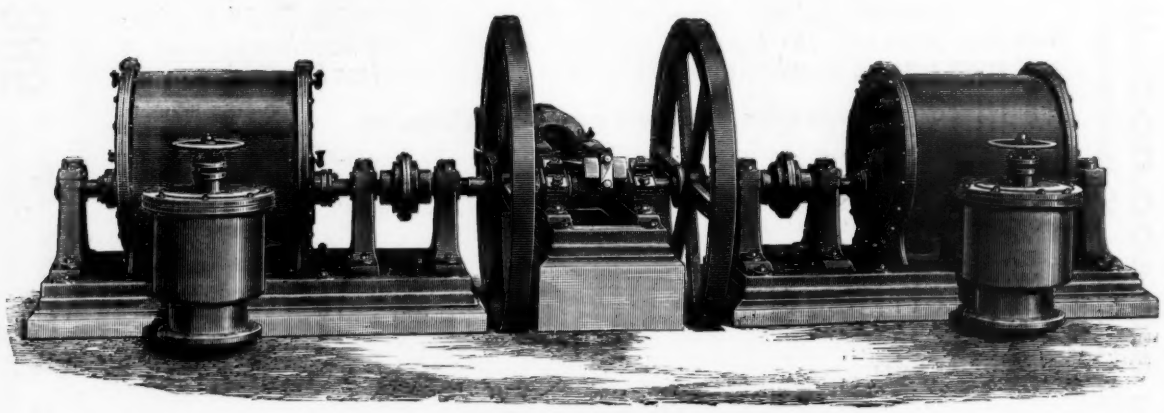
CAST-IRON PIPES, ALL SIZES,
LAMP PILLARS,
STEAM-ENGINES AND BOILERS,
PUMPING ENGINES FOR WATER-WORKS,
BEALE'S GAS EXHAUSTERS,
DOUBLE-FACED SLUICE VALVES,
INTERNAL AND EXTERNAL RACK OR SCREW SLIDE VALVES,
CAST-IRON COLUMNS,
BEAMS, GIRDERS, AND WATER-TANKS,
WROUGHT-IRON TUBES, FITTINGS, &c.



Makers in EDINBURGH of

WET & DRY GAS-METERS,
IMPROVED STATION GOVERNORS,
PRESSURE REGISTERS (*To Indicate New Time*),
PRESSURE GAUGES,
TEST HOLDERS,
EXPERIMENTAL HOURLY-RATE METERS,
EXPERIMENTAL TEST METERS,
CONDENSER THERMOMETERS,
SIEMENS' WATER-METERS,
STREET LANTERNS,
And all Kinds of GAS APPARATUS AND FITTINGS, &c.

PUMPING GAS EXHAUSTER AND ENGINE COMBINED. All Sizes.



BEALE'S GAS EXHAUSTERS AND ENGINE COMBINED. All Sizes.

Prices, with full Particulars, will be given on application.

Two Gold Medals, One Silver Medal, One Bronze Medal, and Two Honourable Mentions,
INTERNATIONAL EXHIBITION, EDINBURGH, 1886.

ALLIANCE FOUNDRY, **GLASGOW.** | SIMON SQUARE WORKS, **EDINBURGH.** | 6, LITTLE BUSH LANE, **LONDON, E.C.**

IMPORTANT TO
GAS ENGINEERS AND GAS MANAGERS:

The most Economical, Reliable, and Handy Tool for Forge Work for

ENGINEERS, MACHINISTS, TOOL MAKERS, FITTERS, FORGERS, STAMPERS, COACH BUILDERS,

AND FOR USE IN

GAS-WORKS, SMITHIES, IRON-WORKS, COLLIERIES, &c., &c.,

IS

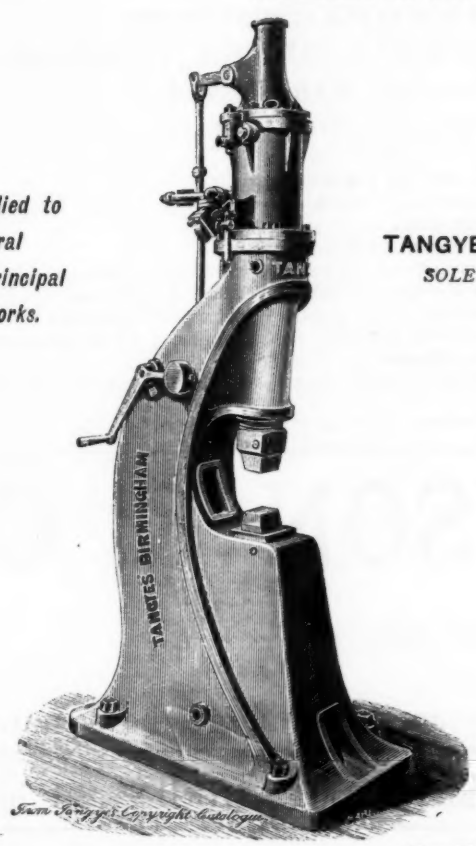
THE TANGYE GAS-HAMMER

(ROBSON & PINKNEY'S PATENTS)

As supplied to several of the principal Gas-Works.

TANGYES LIMITED
SOLE MAKERS.

As supplied to several of the principal Gas-Works.



From Tangye's Copyright Catalogue.

Hand Gear.

From Tangye's Copyright Catalogue.

Foot Gear.

(From Photos of the ¾ cwt. size.)

THE above illustrations represent THE TANGYE GAS-HAMMER as now made. Since its introduction it has been greatly improved both in design and simplicity of working. It has also been constructed to work either with Hand Gear or with Foot Gear.

This—the first Gas-driven Forging Hammer introduced—was designed, and at first recommended only for use in cases where steam was not available or could only be employed at great expense, but the data given below, and which are founded upon reliable and sustained test and trial, demonstrate that the **GAS-HAMMER** may be economically used in competition with the Steam-Hammer, even in places where the price of gas is at its highest.

"*Since the appearance of our* ['*The Engineer*'] *notice, the Hammer has been in some respects re-modelled, and its remarkable economy placed altogether beyond a doubt. . . . The Hammer described is that known as the ¾ cwt. size, and has a cylinder of 7 in. diameter and 6½ in. stroke. The maximum blow is very nearly that which would be given by* **a weight of 3 cwt. falling through a height of 1 ft.**; *and this can be repeated at the rate of* **110** *blows per minute. . . . Extended test in practical smith work has demonstrated that over* **2500 of the heavier blows** *referred to above, can be given with* **one pennyworth of gas** *at half-a-crown per* 1000 *feet—i.e., the Birmingham price to small consumers—or over* 4500 *varying blows for the same consumption.*"—**"The Engineer," Sept. 10, 1886.**

The Gas-Hammer dispenses with Boilers, Coals, Ashes, and Dirt necessitated by Steam-Hammers.

It is ready for work at any moment, day or night, and works as economically for a few minutes' spell as when in sustained operation.

PRICE LISTS AND FULL PARTICULARS ON APPLICATION.

Tangyes Limited, CORNWALL WORKS, Birmingham.

London, Newcastle, Manchester, Glasgow, Paris, Sydney, Melbourne.

ESTABLISHED 1844.] **ORIGINAL MAKERS.** [ESTABLISHED 1844.]

London, 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris, 1867.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.
Since then we have not Exhibited for Prizes.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

And at 37, BLACKFRIARS STREET, MANCHESTER.

TELEGRAPHIC ADDRESSES: "GOTHIC LONDON," "GOTHIC MANCHESTER." TELEPHONE No. 6725.

1st—Are a remedy for all the defects of Wet Meters.
2nd—Are suitable for all climates, whether hot or cold.
3rd—Incur no loss of Gas by Evaporation.
4th—Cannot become fixed by Frost, however severe.
5th—Are the most accurate and unvarying measurers of Gas.
6th—Prevent jumping or unexpected extinction of the Lights.
7th—May be fixed either above or below the level of the Lights.
8th—Cannot be tampered with without visibly damaging the outer case.
9th—Will last much longer than Wet Meters.
10th—Will not cost more than one-half for repair that Wet or Water Meters do.
Are upheld for five years without charge.

W. PARKINSON & CO.

We have much pleasure in announcing that we have purchased the old-established GAS METER and LAMP BUSINESS hitherto carried on by Messrs. JOHN BENT and SON, at Bell Barn Road, Birmingham, together with their PREMISES and MANUFACTURING PLANT, which will in future be carried on as a Branch of our London House.

ESTABLISHED 1816.

Bell Barn Road Works,
BIRMINGHAM.

Cottage Lane Works, City Road,
LONDON.

Manchester Office: 10, Mawson's Chambers, Deansgate,
MANCHESTER.

CONTENTS.

EDITORIAL NOTES:—

GAS, LIGHTING, &c.— PAGE

The London Gas Companies' Accounts for 1889. 683
The London County Council on Photometry. 684
Lord Balfour of Burleigh's Inquiry 684
A Questionable Bill 684

WATER AND SANITARY AFFAIRS—

Dr. Frankland's Annual Report on the Metropolitan Water Supply . . . 685
The Recent Outbreak of Typhoid Fever at Alma Square and the Water Supply and Sewage Pipes 685

ESSAYS, COMMENTARIES, AND REVIEWS:—

Gas and Water Companies in the Stock Market 686
Electric Lighting Memoranda 687
The Waste of Raw Material in Gas Manufacture 688
Accounts of the Metropolitan Gas Companies for the Year 1889 689

NOTES:—

Precautions in Theatre Lighting 690
Testing Wells for Contamination 690
Bricks from Coke 690

COMMUNICATED ARTICLE:—

Electricity in Boston, U.S.A. By an American Correspondent. 690

TECHNICAL RECORD:—

New England Association of Gas Engineers—Annual Meeting at Boston . 691
Simple Forms of Apparatus for Testing and Measuring Gas 694

REGISTER OF PATENTS:—

Gas-Engines—Roots, J. 695
Electric Ignition Apparatus for Gas Engines—Sumner, H. 695
Ignition Apparatus for Gas Engines—Sumner, H. 695
Metallic Joints for Flanged Pipes, Metal Covers, and the like—Baird, R. . 695
Atmospheric Gas Burners—Cox, H. 695
Gas Burners—Dugdale, E. 695
Joint for the Suspension of Gas Lighting Apparatus—Grenier, A. 695
Regulators for Gas Engines—Rossney, W. C., and Cutter, W. G. 695

CORRESPONDENCE:—

The Avery Gas Process 696
Oxygenated Oil Gas and the Avery Process 696
Age of Candles a Factor in Photometry 697
The Probable Existence of Petroleum and Natural Gas in England . . . 697
Steel Melting by Water Gas 697
Water Rates for Temporarily Closed Houses 697

PARLIAMENTARY INTELLIGENCE:—

House of Lords Committees—Morley Corporation Water Bill; Ystrad Gas and Water Bill 698

MISCELLANEOUS:—

Metropolis Gas Supply—Abstract of Chief Gas Examiner's Report for the Quarter ending March 31 699
Presentation to Mr. David Terrace 699
Brussels Municipal Gas Supply—The Gas Committee's Report for the Past Year 700
Blackpool Corporation Gas Supply—A Year's Working; The Reserve Fund 701
Burnley Corporation Gas and Water Supply—The Extensions at the Gas-Works; Local Government Board Inquiry 701
Colonial Gas Undertakings 701
The Public Lighting of New York 702
Meeting of the Antwerp Water-Works Company 703
Gas Enterprise in South America 703
Notes from Scotland 704
Current Sales of Gas Products 705
Gas and Water Companies' Stock and Share List 706

PARAGRAPHS.—Mr. Bolton, 685—Mr. J. H. Campion Coles, 685—Mr. Ellis Lever, 685—Death of Mr. Alderman Simpson, of Rochdale, 686—Waverley Association of Gas Managers, 686—Mr. J. H. Robinson, 686—The Allegations against the Late Mr. Peacock, of Manchester, 686—The Use of Gas-Engines in Germany, 687—The Gas Supply of Paris in the Past Year, 687—Awards at the Dunedin Exhibition, 687—The Brussels Municipality and Electric Lighting, 687—The Frankfort Electrical Exhibition, 688—The Gas-Fittings in the New Guildhall, Londonderry, 688—Death of Mr. A. Wilson, of Cape Town, 691—The London County Council and the Testing of Gas, 693—The Proposed Testimonial to Mr. G. Livesey, 694—The Disposal of London Sewage, 694—A Central Electric Lighting Station in Copenhagen, 694—Gas-Resisting Plants, 694—Alfreton Local Board Water Supply, 696—The West Riding County Council and Water Supply Questions, 696—The Lighting of Courts at Coventry, 697—The Supply of Gas in the Salford Out-Districts, 697—The Falmouth Local Authorities and the Gas Company's Bill, 697—Issue of Further Stock by the Staffordshire Potteries Water Company, 699—Featherstone Water Supply, 700—Electric Light at Weybridge, 700—The Rating of the Otterbourne Water-Works of the Southampton Corporation, 702—The Leicester Corporation and the Water Supply of Barrow-upon-Soar, 703—The Gas Workers' Union and the South Metropolitan Notice, 703—Leeds Corporation Water-Works, 703—The Rating of Water-Works, 703—Proposed Extension of the Purifying Plant at the Carlisle Gas-Works, 705—Northern Coal Trade, 705—Suffocation of Two Women at Leeds, 705—Coal Boring in the South of England, 705—The Plymouth Corporation Water Committee and the Recent Poll, 705—Enlargement of a Gasholder at Halifax, 705—The Increase in the Price of Gas at Bristol, 705—The Proposed Extension of the Mid-Kent Water-Works, 705—The Proposed Extension of the Colne Gas-Works, 705—Sheffield Corporation Water Supply, 706—San Paulo Gas Company, 706—The Corporation of London and Electric Lighting, 706—The Salary of the Stalybridge Gas Manager, 706—Heywood Corporation Gas Supply, 706—Gas Supersedes Electric Lighting on the Promenade Pier, Plymouth, 706—Increased Storeage at the Hindley Gas-Works, 706—The Water Supply of Mumbles (Swansea), 706—Improvement of the Sea-Front at Ramsgate, 706—Darlington Corporation Gas and Water Undertakings, 706—The Bolton Corporation Coal and Lime Contracts, 706—The Proposed Extension of the Rochdale Gas-Works, 706.

THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, APRIL 15, 1890.

The London Gas Companies' Accounts for 1889.

THE abstract of the accounts of the Metropolitan Gas Companies for the past year, which will be found on another page, places on record the working results of a momentous time in the history of the gas supply of London. Little did we or any other observer suspect, twelve months ago, that the year which was then fairly opened would close in the midst of a turmoil and struggle that would leave an indelible mark on the next abstract of the Metropolitan Gas Companies' accounts which we should have in due course to publish. For many years we have followed in this way the development of the gas undertakings supplying Inner London; and these statistics are as interesting and valuable as ever. Indeed, they may be said to increase in interest for those who have occasion to quote them as data, because successive reductions of price have brought all the Companies down very closely to their bearings, so that they must respond very quickly to all fluctuations of business and every variation of the prices of raw materials, &c. In the first place, the amount of capital employed by the Companies calls for notice. The gross amount of capital and borrowed money required to light London with gas in 1889 was £14,350,896, which is an increase of £126,673 on the figure for the previous year; the whole being for the South Metropolitan Company, with the exception of a nominal addition of £110 to the Commercial Company's obligations. By the employment of this capital, a revenue of £4,408,323 was earned, of which £2,950,224 was for gas sold by meter, £210,429 was for public lighting, £80,670 came from rents of meters and stoves, £1,149,257 from residuals, and a balance of £17,741 from miscellaneous sources, including sales of old materials. With regard to the sales of gas, it is remarkable that all the Companies show a decrease, amounting in the whole to £141,393; the reason, of course, lying mainly in the reduced prices at which the gas was sold as compared with the preceding year. There is a noteworthy increase under the head of residuals, of £141,312, to which the Companies owe their ability to continue to sell their gas at the cheap rates, notwithstanding the general rise of expenditure to be presently noticed. Coals, for example, cost £1,593,200, or £79,669 more than in 1888, notwithstanding the partial cessation of the coal duty which came into operation for the latter half of the year. That all the entries under the head of expenditure should show an increase for the year, with the single exception of the salaries for management, is a striking evidence of the care with which the administration of these great undertakings is conducted. The expenses of labour for gas manufacture amounted to £448,884; being an increase of £71,509, which will be more for the current year. Everything, as already stated, costs more. Purifying is dearer by £7940; wear and tear, by £30,665; rents, rates, and taxes, by £14,049; bad debts and extraordinary expenses, by £26,488; repair and renewal of meters and stoves, by £23,354. The penultimate sum is susceptible of explanation, seeing that the total outlay of £78,499, to which it applies, includes £30,349 for the expenses of the South Metropolitan strike, and £18,060 for Chartered annuities. But for the former extraordinary charge, therefore, this entry would have shown a decrease. There is something not quite satisfactory, however, about the large increase for repairs and renewals of meters and stoves. It is the latter class of property that is more particularly affected; and one is disposed to ask whether these expenses of keeping up hired-out stoves are not getting so excessive as to require the particular attention of Directors and Managers. Altogether, what with diminished receipts for gas and increased outgoings for necessaries, the gross profits of the Companies fell to £1,273,419, which is upwards of a quarter of a million less than their profit for the year before, due to the fact that they spent considerably more than a quarter million in excess of anything they have ever disbursed during previous years. The turn of trade was, therefore, more than a quarter of a million against the London Gas Companies last year. They cannot stand this for long; and unless circumstances alter, an increase in the price of gas will become a question of practical politics with all of them.

Turning now to our reductions of the amounts given in the accounts to the standard of a ton of coal carbonized, it appears that the capital required fell to £5 7s. 2·25d. from the £5 11s. 2·37d. at which it stood in 1888. The greatest reduction was effected by the Chartered, which came down from £6 0s. 3·89d. to £5 13s. 11·96d., and thus took a long step towards the average of the other Companies. The Commercial Company attained the remarkably low figure of £4 0s. 10·86d. per ton, at which their capital should weigh lightly enough. Of course, the revenue of all the Companies has sunk per ton of coal carbonized; the average last year being £1 12s. 11·12d. as compared with £1 14s. 4·92d. Coals, for all the rise, hardly cost 1d. per ton more; while labour went up from 2s. 11·40d. to 3s. 4·23d. per ton. The great additional

expenditure for the year works out to rather less that 1s. per ton of increase; and all the extraordinary expenses only raise the average entry from 4·88d. to 7·04d. per ton. In the case of the South Metropolitan Company alone, however, this item jumps from 2·72d. for 1888 to 1s. 3d. for 1889.

The carbonizing work of the three Companies is displayed in the following table:—

TABLE *of the Residuals and Gas made, per Ton of Coals carbonized, by the Metropolitan Companies in the Year* 1889.

Name of Company.	Coke per Ton of Coals, in Bushels.	Breeze per Ton of Coals, in Bushels.	Tar per Ton of Coals, in Gallons.	Ammoniacal Liquor per Ton of Coals, in Gallons.	Gas Made, Cub. Ft. per Ton.
CHARTERED . . .	46·52*	3·12*	10·90	30·97	10,334
COMMERCIAL . . .	47·18	3·90	10·36	38·48	10,125
SOUTH METROPOLITAN	49·54	3·43	9·89	34·15	10,010
Mean per Ton . .	47·25	3·25	10·64	32·25	10,245

* The returns of coke and breeze are given in *tons*. These have been reduced to bushels on the Company's basis of 9½ cwt. of coke to the chaldron, and 50 bushels of breeze to the ton.

The last return of the kind showed a yield of 10,356 cubic feet of gas per ton of coal carbonized; so that there has been a marked falling off. Curiously enough, the slackening in the case of the South Metropolitan Company was only 53 cubic feet per ton; while the Chartered lost 138 cubic feet, and the Commercial 50 cubic feet per ton. We know the interpretation applied by Colonel Makins, M.P., the Governor of the Chartered Company, to the falling off in their case. He attributed it to the decreased efficiency of the stokers under the eight-hour system; and if he had also admitted the demoralization consequent upon the vagaries of the Union leaders, he would have fully explained the phenomenon. We are not desirous of working these figures for more than they are worth, nor of putting on them any interpretation which they will not bear; but it is at least noteworthy, as a reply to the random assertions of Messrs. Thorne, Hutchins, and Co., that, with all their "green" hands, the South Metropolitan Company lost less gas than did the Chartered, which was the hotbed of the Union, and only an infinitesimal shade more than the Commercial, which the Union leaders professed to regard with special favour. That the table shows a slight reduction in the make of breeze, and an increase in the coke, probably means that the yards were kept clearer owing to the improved demand. The other figures do not call for particular comment. Altogether, while it cannot be said that these accounts make a very favourable showing for the Companies, who appear to have had a rough time of it from one cause and another, the fault is not theirs. Where they could effect an improvement, as in keeping down the capital expenditure and reducing the cost of management, they did their best; and in these respects the accounts for the year are quite satisfactory. Beyond this, and where exterior conditions come into play, the Companies suffered a decided check last year from circumstances already mentioned, which will require to be compensated for, if at all, by a handsome increase in gas consumption for the current year. If they do not get this, it is difficult to see how the respective Boards are to escape the necessity of "considering their position," in face of the additional expenses that will certainly come upon them. With a good rate of growth and residuals keeping up, the present situation may possibly be maintainable; but hardly otherwise.

The London County Council on Photometry.

THE London County Council are desirous of doing something to remove the deadlock into which gas examination under their auspices has drifted. Last July they addressed a letter to the Board of Trade urging upon the Government the desirability of introducing into Parliament a Bill to: (1) provide a more trustworthy standard of light for photometrical purposes; (2) to prescribe a standard form of photometer; and (3) to give legal force to tests of gas made with the portable photometer. Nothing came of this motion, partly, no doubt, because the Council tacked on the last utterly superfluous and absurd suggestion to the others, which were reasonable enough. Now the Council, on the recommendation of their Sanitary and Special Purposes Committee, have decided to renew their appeal for the legalization of a better standard of light and a standard type of photometer, and have dropped the notion of legalizing the portable photometer. Thus lightened, their action may come to something useful. The same Committee have reported that an additional gas-testing station is needed for the district of Old Street, St. Luke's, where they seem to imagine that poor gas has been supplied by The Gaslight and Coke Company; but on what grounds the accusation is made does not transpire. Possibly the wheelbarrow photometer has been exercised of late in this neighbourhood. Of course, there is no objection to the erection of as many gas-testing stations as the great town may require; but as every additional establishment of the kind means more money, it is necessary to test the claims advanced for the outlay in every case. It has always been understood that the gas-testing stations should have some relation to the distribution of gas from the various manufacturing stations, so that none of these should be able to send gas into any part of the town without incurring the liability of having the product tested in the condition in which it reaches the consumers. If the gas sent into St. Luke's has not been tested anywhere else on its way, a testing-station may be reasonably called for in this densely-inhabited region; but if it is demanded merely because the portable photometer has, somewhere in the locality, hit upon a dead main in a back street where the sweating tailors who throng in these parts prefer to use cheap oil, the requirement should not be satisfied without protest.

Lord Balfour of Burleigh's Inquiry.

THE inquiry which has been for some time in progress, under Lord Balfour of Burleigh and Mr. Courtenay Boyle, for the settlement of the details of the Railway and Canal Traffic Act, has now arrived at the stage of dealing with traders' objections to the revised classifications of goods proposed by the various Railway Companies. These voluminous proceedings are printed day by day, and sold at a moderate price; forming a mine of information respecting the merchandise traffic of the country. Last Thursday the Commissioners met to consider the position of articles in Classes A and B, and took a mass of evidence respecting the classification of heavy goods and so-called refuse materials of many kinds. The new classes are often in conflict with the complicated old classification framed by the Railway Clearing House, which has been eked out as new traffic has sprung up, until it has become impossible to trace any principle or system in the arrangement. In sweeping away all these demi-semi-subdivisions, the creations of emergency, and replacing them with a system of classification resting upon broad lines that shall be intelligible to traders and carriers alike, great difficulty has been experienced in settling the knotty point of whether, when a special new class has been created to meet a particular demand, one order of merchandise affected has been favoured or another placed at a disadvantage. For example, when coal has been severed from pig iron, the question has arisen whether the coal has been lowered or the iron raised in the schedule. Among the articles considered on Thursday occur many that are largely dealt in by gas manufacturers, and include the bulkiest gas-works residuals. As illustrating the divergence of views respecting the principles of classification of goods for transit by rail, it may be stated that one advocate told the Commissioners that if there were a class lower than coal, these goods—creosote, coal tar, and gas water—ought to go into it, because they are the residual products of coal. On the other side, the Railway Companies contend that these fluids are of a troublesome and dangerous character; and that, while not liable to damage themselves, they may cause damage to other goods. Accordingly, they propose to put them in the next higher class than coal. No decisions are given at these sittings; only evidence being taken, and objections heard and discussed. The inquiry is a very exhaustive one; and with Commissioners so painstaking, and desirous of showing fair play, it will be the traders' own fault if their views are not properly placed upon record.

A Questionable Bill.

A BILL to amend the Metropolis Management and Building Acts has been introduced into the House of Commons, at the instigation of the London County Council, which aims at the improvement of the condition of the undedicated thoroughfares of the Metropolitan area, and includes other

provisions not quite so acceptable. It has long been a grave scandal that undedicated roads, although lighted and sewered under the supervision of local authorities, have been allowed to fall, as thoroughfares, into a very dangerous and insanitary state for want of power on the part of such authorities to repair the surface of roadways or footpaths without paving them as new streets. Where the subsoil of these roads is valuable gravel, sand, or chalk, there has practically been nothing to prevent people from making quarries of them; and when the subsoil is not worth carting away, the surface often forms a convenient tip for rubbish. The Bill under notice provides a remedy for these and other evils, and therefore deserves support in the public interest. There is one clause in the measure, however, which requires examination, if hardship is not to be inflicted on Gas and Water Companies, under the pretence of a benefaction to the community. This clause proposes that "no Vestry or District Board shall be "liable to any Company for damage or injury caused "by the use of steam-rollers or other heavy machinery "employed in the making, maintenance, and repair of "any street, road, passage, or way within their parish "or district, to mains or pipes laid or relaid after the "passing of this Act under any street, road, passage, or "way, if such mains or pipes shall have been laid or "relaid at a less depth than 24 inches from the surface," measured to the top of the barrel of the main or pipe. Exception is made in the case of rollers exceeding 10 tons in weight, and in cases where the local authority shall have themselves lowered the surface of the roadway over the pipe or have been guilty of negligence. While there is nothing very objectionable in these requirements (for gas-mains are not, as a matter of fact, laid at a less depth than 24 inches), it will be as well for all such details to be considered by a Select Committee before being enacted by Parliament. Colonel Makins, M.P., has notified his intention to move that the Bill, on its second reading, be so referred, and that opponents to the measure shall be heard by Counsel. Mr. J. Stuart, M.P., has on the other hand, given notice that, by way of an amendment to Colonel Makins's motion, he will move that it is inexpedient to refer the Bill to a Select Committee, with power to the petitioners against the Bill to appear by Counsel, while the County Council are not authorized to appear by Counsel in support of it. This, Colonel Makins might retort, is the disability incurred by the Council through seeking to gain their object by means of a public instead of a private Act. It is necessary for the defenders of interests that may at any time be affected by the policy of the County Council to watch not merely the special and "omnibus" Bills of this body, but also the *pseudo*-public measures backed by the legislators who happen to be members of the Council. It would be a pity if a measure of such serious public importance should be prevented from becoming law by opposition based on the principle of objection to trenching in this manner upon the domain of Private Bill Legislation; but the County Council have already earned a reputation for trying to smuggle objectionable clauses through Parliament, and cannot complain if the penalty of such conduct is visited upon them.

Mr. Bolton, the Borough Engineer of Wigan, has had his salary increased by £100 per annum.

Mr. J. H. Campion Coles, Secretary of the Eastbourne Gas Company, has resigned the office of Town Clerk, which he had held since the incorporation of the town in 1884, having previously been Clerk to the Local Board formed in 1859, and superseded by the Corporation. Mr. Coles has lately been suffering from impaired health; and the relinquishment of some of his numerous duties has become advisable. Mr. Coles is Vestry Clerk and Registrar of the Burial Board of Eastbourne; and, in addition to his appointment with the Gas Company, is Secretary of the Pier and Devonshire Park Companies.

Mr. Ellis Lever is reported by one of the Manchester papers to have greatly improved in health by the care he received at the private nursing institution in London to which he was removed from the First Avenue Hotel, followed by a visit to Brighton; and consequently he was able to return to his residence at Colwyn Bay last Wednesday. According to the above-named authority, he has expressed his desire to meet the Committees of the Salford and Manchester Corporations at their earliest convenience. The Mayor of the former borough has received from the Treasurer of the Salford Royal Hospital an acknowledgment of the cheque for £50—the now celebrated donation by Mr. Lever to Brunswick Chapel, Pendleton—presented to that institution by the Council.

WATER AND SANITARY AFFAIRS.

THE annual summary of the Registrar-General in reference to London and sundry large towns, is accompanied by Dr. Frankland's report on the Metropolitan Water Supply for 1889. The weather is considered to have been, on the whole, favourable to the operations of those Companies who take their supplies from rivers; and as the increased efficiency of subsidence and filtration observed for several years past has been fully maintained, the result arrived at is that the quality of the water last year was "even better" than in 1888. The chemical analyses are said to show that, during the greater part of the year, the river waters, both from the Thames and the Lea, "contained only a very moderate amount of organic "matter." Taking 1000 as the proportion of organic impurity present in Thames water as delivered in London in 1868, the quantity last year appears as 677; being the lowest in the whole series of 22 years. The Lea water, although having a better figure than that of the Thames, compared with the same standard, hardly shows the same progressive improvement. In 1868 the proportion of organic impurity was 484; whereas last year it was 504. A favourable feature consists in the fact that the proportion in 1887 was down to 473; and on two other occasions in the last six years it was no higher than 500. The deep-well waters fluctuate considerably; the proportion of organic impurity being 254 in 1868, 312 in 1869, only 150 in 1871, as high as 409 in 1882, and appearing as 268 last year. Dr. Frankland has great faith in the natural filtration which the water of the deep wells undergoes in passing through the intervening strata. The amount of chlorine in the various waters is said to indicate that on no occasion has brackish or tidal water gained access to the reservoirs. In 1885 there was a slight increase in the average amount of chlorine in the river waters, attributable to the small rainfall. This has continued down to the past year, but has not been further augmented; whereas a considerable increase of chlorine is reported in respect to all the deep-well waters. For this no explanation is offered. Concerning the river waters, it appears that the maximum amount of "organic "contamination" fell last year to nearly the lowest amount observed since 1867. The cases of inefficient filtration are said to have been more numerous in 1889 than for some years past. This is ascribed to the foul condition of the Thames in the month of January, by which the filter-beds of the Companies were "taxed to the utmost." But the failures were only two; being once in the Southwark supply, and once in the Grand Junction. It happens that the Southwark and Grand Junction Companies are not able to store so many days' supply of unfiltered water as the other Companies, and are on that account the less able to avoid the introduction of flood water. The fact is one which has been referred to by General Scott, who nevertheless admits, as a modifying circumstance, that these Companies, like the Lambeth, have the resource, during floods, of pumping from the gravel beds adjoining the Thames. It is observed that on two occasions last year the Tottenham water, coming from a deep well, was slightly turbid. In no single case were any "moving "organisms" discovered; and in no instance was the water "very turbid," although there were seven such cases in 1868, besides 33 of lesser degree. The improvement effected in recent years shows that the Companies have been laying out money to a good purpose. The reduced death-rate in the Metropolis, reaching a lower point in 1889 than in any previous year, indicates that the water supply is of a quality conducive to the health of the population, and by no means retrograding in its character.

Dr. A. Wynter Blyth, the Medical Officer of Health for St. Marylebone, has presented the Vestry of that parish with a report on a recent outbreak of typhoid fever at Alma Square. The number of households affected was seven; and there was one death. The report states "there was ample evidence that something from time to "time happened to the water." Ultimately, the ground was opened by the Water Company, when, to use the language of Dr. Blyth, "a serious state of things was "disclosed; with few exceptions the pipes branching from "the main were either wholly of iron, or partly of iron, "partly of lead, and the ferrules in four instances were "defective, leaking when the pressure was put on." At first sight the only "serious" part of this affair would

seem to be the waste of water which befell the West Middlesex Water Company, if that Company chose to look upon it in that light. We have to read farther on to discover that there was something wrong with the sewerage. An account is given of sewer pipes with dead ends and defective falls, giving rise to offensive odours in the neighbourhood; and at length we learn that in one place "a good deal of sewage was found to have escaped into "the earth around the pipes." Dr. Blyth thereupon observes: "The importance of this last discovery, "when considered in connection with the defective "ferrules, is obvious." Hence it was considered to be "proved that there was at intervals contamination "of the water supply to Alma Square." Proceeding with his argument, Dr. Blyth says: "In the first place there "were certain defective ferrules; and in the second "place, a soil which in part was much polluted by "sewage." As the sewage is alleged to have been the cause of the sickness, we should rather have put that in the first place; and the damaged ferrules in the second. There is some reason in the remark contained in a letter written by Mr. Carter, one of the officials of the Water Company, suggesting that the defects in the house pipes in Alma Square were "not the primary cause of the sick-"ness," but that this was rather attributable to "the insani-"tary state of the main drain to the square." This drain consisted of 15-inch glazed pipes, laid at about 2 ft. 6 in. below the pavement, and without sufficient fall to empty itself. Unclosed joints between the pipes permitted sewage to escape; the ground when opened being found black and offensive. Dr. Blyth says that since his report was presented, the iron service-pipes have proved to be more seriously damaged than he had first supposed. The Medical Officer has a very keen eye for defects in the water-pipes, but appears to be less concerned about the sewers. He recommends a law compelling the Water Companies to open the ground and examine the state of the service-pipes "once "at least every five years." Let us imagine this all over London! The expense of this inspection should, he thinks, "fall upon those who have the monopoly of supplying for "profit the water." There is no recommendation concerning the sewers which poison the water, nor any proposal that they shall be "inspected once at least every "five years," nor at any period of time whatever. The idea in either case is extravagant; but if there is to be any complaint about the iron water-pipes, there is far more reason to criticize the manner in which the Vestry of Marylebone provided for the drainage of Alma Square. Yet Dr. Blyth sees nothing wrong with respect to the parish authorities; or, at least, he is "to their faults a "little blind, and to their virtues very kind."

Death of Mr. Alderman Simpson, of Rochdale.—During the sitting of the Rochdale Town Council on the 3rd inst., Mr. Alderman W. Simpson was seized with apoplexy; the attack resulting in his death late on the following day. He was the oldest member of the Corporation, having been elected on the incorporation of the town in 1856. For many years he was Chairman of the Gas Committee; and during the time he occupied this position the works were entirely remodelled and greatly extended.

Waverley Association of Gas Managers.—The 58th half-yearly meeting of this Association was held at Duns. Mr. W. Robson, Manager of the Selkirk Gas-Works, presided. The Secretary (Mr. George Taylor, of Jedburgh) read the minutes of the last meeting, which were approved. After a short address from the Chairman, touching on different subjects connected with the manufacture of gas—among others the probable high price of coal for the ensuing year and its effect on the price of gas—there was a discussion on the best means of tiding over the difficulty. The following gentlemen took part in it:—Mr. Smith, Hawick; Mr. Vass, Portobello; Mr. Walker, Berwick-on-Tweed; Mr. Thomson, Duns; Mr. Smith, Melrose; Mr. Taylor, Jedburgh; and Mr. Dobbie, of the Waverley Chemical Works, Leith. The meeting then appointed Mr. Thomson, of Duns, President for the ensuing year; Mr. Taylor being re-elected Secretary and Treasurer. Mr. Smith, of Hawick, next presented Mr. Robson with the Association's gold medal, the inscription on one side being: "Waverley Association of Gas Managers, William Robson, President, 1890;" on the other, "William Robson, Selkirk, originator of the first Association of Gas Managers, 1861." The business being finished, the members and friends dined together at the Swan Hotel. Afterwards a number of those present visited the Duns Gas-Works, under the guidance of Mr. Thomson, and congratulated him on their efficient state. The next meeting of the Association is to be held at St. Boswell's, instead of Innerleithen, as formerly arranged.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 706.)

THE good time on the Stock Exchange that is coming, is a long while about it. What with holidays, Jewish after Christian (it is a pity they cannot be simultaneously adjusted), the slow re-awakening of speculation, Argentine troubles, and one thing or the other, dealers are complaining of utter stagnation. The Bank rate, after standing at 4 per cent. for as many weeks, was lowered on Thursday to 3½ per cent. But this put no life into things; for it had been thoroughly anticipated. A 3 per cent. rate, however, which should not be far away in the distant future, is bound to bring money out of the holes and corners where it is stowed away; and the light of its presence will shine in Capel Court. As for the Gas Market, it has been quiet enough—like all the rest; and those standing in it have had plenty of leisure to let their thoughts wander to electricity, and to exercise their wit or ingenuity in the coinage of an electromotive verb. Still there was no appearance of any tendency to weakness; for all issues have stood as firm as a rock. Gaslight "A" has been steadily operated in at about 252-253; and on Saturday the best figure of the week, 254, was reached. "H" and "J," also, have fetched good prices. Not a single transaction of any sort was effected in South Metropolitans; and all issues stand as they were. It was the same case with Commercials. The old stock is still quoted too low in comparison with the new, and should be adjusted on *ex div.* quotation. The Suburban and Provincial Companies have likewise enjoyed a period of complete quiescence; but buyers of British are ready to give 1 higher. As for the Foreign undertakings, hardly any has been touched except Imperial Continental, which maintains its recent advance with firmness. The only change of quotation is an improvement of ¼ in Bombay. The Water Companies have had very few transactions effected in them. Generally speaking, they may be quoted steady. New River is one point better; but Southwark and Vauxhall "D" shares have receded 2.

The daily operations were: Upon the reopening of the market on Tuesday, dealings in Gas were restricted to Gaslight "A," at rather better than middle prices. Bombay advanced as noted above. Nothing at all was done in Water. Business in Gas was very slack on Wednesday, though some of the issues less frequently dealt in changed hands. Water was again a blank. On Thursday the two big issues, Gaslight "A" and Imperial Continental, had it nearly all to themselves, and realized very good prices. Water continued nearly stagnant; but the changes in quotation noted above were effected this day. Friday was a repetition of the previous day in Gas, with additional transaction in Gaslight secured issues. British rose ½. Water was unchanged. Saturday was tolerably active for a Saturday, but without any noteworthy incident; and all quotations in both Gas and Water closed without further variation.

Mr. J. H. Robinson, one of the Examiners of Private Bills in the House of Commons, succumbed a few days ago to an attack of influenza, while on a visit to Guernsey.

The Allegations against the late Mr. Peacock, of Manchester.—A representative of a Manchester paper has had an interview with Mr. T. K. Peacock, Solicitor, of that city, in reference to the imputations upon the character of his father, to which Hunter gave publicity during the recent Lever trial at Leeds. Mr. Peacock, who is brother of the young man (now in America) mentioned by Hunter as being in Lever's service as confidential clerk, is indignant that such a charge should have been made. He says the inference from the published reports is that his father was a Superintendent in the employ of the Corporation at the time referred to by Hunter—the end of 1876 or the beginning of 1877; while as a matter of fact he died on Sept. 3, 1876. With regard to the suggestion that his brother Arthur was in Mr. Lever's employment during his father's term of office under the Corporation, he thinks it is disposed of when it is stated that down to the father's death, and for some time afterwards, Arthur was a commercial traveller for a firm in Manchester. It was as far in the year 1877 as October when he entered Mr. Lever's office; and at no time, as far as Mr. Peacock is aware, could he be considered a confidential clerk there. In 1878 he left Mr. Lever's service altogether. The suggestion that the late Mr. Peacock was receiving bribes, he considers is shown to be false by the fact that his father had died more than twelve months before his son Arthur became clerk to Mr. Lever. As to Arthur's part in the matter, his brother denies emphatically that he can have enjoyed Mr. Lever's confidence for any such reasons as those alleged. Mr. Peacock has expressed his willingness to give the Corporation every assistance in investigating the matter. The result so far of the labours of the Sub-Committee appointed by the Gas Committee of the Corporation has been to request the Town Clerk (Mr. W. H. Talbot) to institute further inquiries, and, if necessary, obtain Counsel's opinion as to whether or not the evidence available is sufficient to justify proceedings being taken against anyone.

ELECTRIC LIGHTING MEMORANDA.

Electricians require a Word—The New York Senate on the Danger of Electric light Wires—Failure of the Paris Electric Meter Competition—Discontinuance of Electric Tram Cars in Brussels.

THE latest difficulty of the electricians is of a peculiar nature, being in a special sense verbal. Lord Bury has created a commotion by stating that in the matter of electrical locomotion material progress has outstripped the language; so that, while electrical propulsion by land and water is an accomplished fact, there is absolutely no word that can be employed to describe this means of travel. What is wanted is a term as plain and simple as "steam" or "sail" to serve as the verb active for electrical engine-driving. Immediately the need was proclaimed, there was a rush into the correspondence columns of *The Times* of a great multitude of word-coiners, learned and simple, the majority of whom would be instantly indicted as philological "smashers" by any competent authority; for their suggestions are to genuine words what base coins are to sterling currency. It is very difficult to make new words just when they are wanted, as many an inventor has found. Yet the noun does not present nearly so much difficulty as the consequent verb. There was no trouble of this kind in connection with electric lighting, because the noun "light" is a common word, which only needed to be qualified by the proper adjective to form a perfectly acceptable compound; so that electric lighting at once took rank with the parallel terms gas lighting, lamplight, &c. This ease of locution is wholly due to the presence of the fundamendal word "light." If electricians were to try to substitute any single new word for the compound term "electric light," they would be in the same trouble that they confess to in connection with electric locomotion. This difficulty has a half-humorous side; but it is real enough, and will become more pressing when the new Metropolitan electrically-worked subway comes into use. How to describe in one word not only the idea of motion, but also a motion by means of electricity, just as the verb "to steam" does in its own proper applications, is the difficulty. Words like "electro-mote," although cumbrous, are likely to be adopted in default of a better. The neatest term suggested is the word "force" used as a verb, although no known word can be used in a new sense without incurring risk of confusion or at least of ambiguity. In time, no doubt, the ingenuity of the people generally will hit upon the right word. In a matter of this kind, the street is often a better authority than the college.

The vexed question of providing against the danger of electric wires has come under the consideration of the New York Senate Committee on General Laws, who have made a report on the subject. It is the opinion of the Committee, after hearing expert evidence, that no electric light or power current of more than 250 volts should be allowed to enter any building, and that after Jan. 1, 1892, no overhead conductors carrying currents for lighting or power purposes should be permitted in any street, highway, or public place in any city of the State having a population of 125,000 and upwards. It is considered that underground conductors are practicable, and can be made safe. For towns of less than the above-mentioned population, it is thought that aërial wires may be allowed; but even in these it is recommended that the wires through the principal streets should be buried. The report says that evidence taken showed the fire risk of electric lighting to be no greater than from gas, if as great. The Committee are reluctant to recommend rules and regulations for the conduct of an industry so new, complex, and undeveloped as that concerned with the commercial utilization of electricity; but they consider that, in the interest of public safety, there should be some form of supervision over the industry by properly qualified State or local authorities analogous in kind to the control now exercised over steam-boilers.

As stated in the JOURNAL last week, the Commission entrusted with the judging of the apparatus submitted in competition for the prizes offered by the Paris Municipality for electricity meters have reported on the 28 instruments between which rivalry could be regarded as serious, and to which accordingly their attention was confined. The Commission were not able to award the chief prize of 10,000 frs., or even the minor prizes in the original list, but recommend awards of 2000 frs. each to M. Caudery and M. Aron, and of 1000 frs. each to MM. Brillie, Blondlot, and Jacquemier, by way of encouragement to these inventors. It is admitted that the results, taken as a whole, are not so favourable as had been hoped; for nothing like a satisfactory electricity meter, according to the terms of the competition, could be found in the list. The competition is to be kept open to the end of next August; but it is doubtful whether French inventors, for whom the prizes are evidently intended, will be able to evolve anything fresh in the meter line by the extended date. It is noteworthy that, with the exceptions of MM. Caudery and Aron, none of the competitors had previously produced an instrument known to possess the elements of possible utility.

Electric traction is under a cloud in Brussels, where the Tramways Company, after four years' experience of the working of three accumulator cars, have decided to discontinue running them, and to return to horse traction. It is reported that while the cars in question were fairly successful in working, they were financial failures; the Company having lost £1144 on them by way of difference between the cost of electric and horse traction. This action of the Tramways Company of Brussels is rightly regarded as very serious by all who are interested in the future of accumulators in connection with locomotion. Much argument is used by some electricians to prove that the Company have acted unfairly to the system; but the dead loss on the experiment is a fact that no amount of talk can dispel. The words of the Directors' report on the subject are very significant. They say that their four years' experience shows that "whatever reductions may be made in the maintenance of the accumulators, and whatever the possible improvements in the mechanism of the motors, accumulator traction is not practically applicable to the Company's system from the economic point of view." It is to be perceived from these expressions "where the shoe pinches." The maintenance of the accumulators is evidently the chief expense in locomotion by their aid, and the statement is of value for the light it throws upon the employment of accumulators for other purposes. Several electric lighting companies in the United Kingdom employ accumulators in various ways, whether as a means of storeage, to equalize production, or to convert high-potential into low-potential currents. As yet, none of them has an experience equal in length to that of the Brussels Tramways Company; but already it is believed that several know more about the cost of working through accumulators than they are willing to tell.

The Use of Gas-Engines in Germany.—The Berlin correspondent of *Industries* points out, as an indication of the profitable nature of the gas-engine business, that the Gas Motoren Fabrik Deutz, the holders of the "Otto" patent for Germany, made a profit last year of 1,250,000 marks. They will pay a dividend of 36 per cent., as compared with 31 per cent. for 1888.

The Gas Supply of Paris in the Past Year.—Notwithstanding the largely-extended use of the electric light in Paris last year, the quantity of gas supplied by the Paris Gas Company increased by something like 513 million cubic feet; the quantity consumed being 11,022 millions as compared with 10,509 millions in 1888. It is a curious fact, and one worthy of record, that in a previous exhibition year (1867), when there was no electric lighting in the city, the increase was almost the same; the exact figures being 14,235,157 cubic metres then, and 14,560,250 cubic metres in 1889. The profit realized by the Company last year was £1,580,000; but, as our readers are aware, a large portion of this (£566,000) goes into the coffers of the Municipality under the terms of the Company's concession. At their recent annual meeting, however, they were able to declare a dividend of 78 frs. per share, being at the rate of about 31¼ per cent., and leave a balance of £8650 to be carried forward.

Awards at the Dunedin Exhibition.—In the JOURNAL last week we noticed that Messrs. J. Wright and Co., of Birmingham, had received a first-class award at the New Zealand and South Seas Exhibition at Dunedin. From the complete list of awards in Class VI. (Heating and Lighting Apparatus) which have since reached us, we find that the same firm also had a first-class award for their gas-fires, and a third-class award for their tubular gas heating-stove. Messrs. T. Fletcher and Co., of Warrington, had first-class awards for their gas cooking-ranges, gas-fires, and laboratory gas appliances; and Messrs. H. and C. Davis and Co., and the Leeds Floor-Warming Stove Company, second-class awards for their gas-fires. The Wanzer Manufacturing Company had a third-class award for gas-fires. For lighting apparatus the Wenham Company and the Albo-Carbon Company both received first-class awards. A number of local exhibitors had awards for heating and lighting appliances.

The Brussels Municipality and Electric Lighting.—Reference has been already made in the JOURNAL to the proposals which have been submitted to the Brussels Municipality by various firms for carrying out a scheme of electric lighting in the city. The two propositions specially considered were those of M. Van Rysselberghe and Messrs. Siemens and Halske. The companies who did not send in tenders have expressed much dissatisfaction at the conditions laid down by the Municipality, and contended that it was impossible to make a really definite offer on the basis put forward by the authorities. The question has been very warmly discussed for some months in engineering circles, as well as at several meetings of the Belgian Society of Civil Engineers. The general conclusion come to was that the Municipality should begin *de novo;* starting with the publication of clearly-defined conditions on which tenders could be based. This course has commended itself to the Committee of the Council who have the matter in hand; and they have decided, with practical unanimity, to pursue it. The result is that the whole of the time which has elapsed since the 1st of July last year has been occupied in useless discussion; the interval being utilized by the various private electric lighting companies for pushing their systems with as much vigour as possible. The consequence will be that by the time the Municipality have established their station, probably most of the largest consumers will be already provided with installations. It will be a matter of regret if this electric lighting business should entail losses which will have to be met out of the profits of the gas undertaking.

THE WASTE OF RAW MATERIAL IN GAS MANUFACTURE.

An interesting question arises out of the recent reports that have appeared concerning the working of the various oil and water-gas schemes now before the public. It is with regard to the duty rendered from the raw material by different methods of gasifying solid and liquid hydrocarbons; and it will be impossible to treat the present discussions and explanations of these systems as exhaustive unless this question of their respective duty is cleared up by satisfactorily scientific handling on the part of some competent authority. What we mean by the duty of a gasification method is precisely the same as is meant by the same term when used in connection with steam-power plant. And, though there is no such absolute datum in gas making as Joule's equivalent supplies to the mechanical engineer, whereby an accurate balance-sheet of engine performance with relation to fuel consumption may be prepared, yet it is possible to prosecute analytical investigations of gas-making systems on nearly the same lines, and with precisely the same object—to determine the loss by exchange. We know that Nature does not give change without charging for the accommodation. When a known weight of coal is put into a steam-boiler furnace, which is intended to convert the heating power of the fuel into the mechanical power of the engine, there is a heavy percentage of the potentiality of the coal lost in the process of transformation. Similarly, when a ton of coal is carbonized in gas-making retorts, the product is a redistribution of the original atoms in the three states of solid, liquid, and gas, which, if they could all be put into the balance against the coal from which they were derived, would "kick the beam." Theoretically, the arrangement should not entail any loss of weight; but practically there is a loss, although not a very considerable one. In the manufacture of coal gas, a little apparent deficiency (say) in the weight of gas obtained may generally be ascribed to a change in the relative proportions of the other products; but, except within narrow limits, there is no room for increasing the weight of the gas at the expense of any other product. In brief, the amount of preventible waste in practical gas making is not serious, because what does not appear as gas is mostly to be found as coke, tar, and water. The most obvious waste is the carbon deposited in the retorts and hot ascension-pipes, which the gas maker usually begrudges as being not only troublesome in itself, but as eminently an example of "matter in the wrong place."

We do not, at the moment of writing, recall any attempt on the part of chemist or gas engineer to determine the exact proportion of waste of the raw material which is capable of being represented as carbon deposited in retorts and pipes. It would not be an easy thing to do with any respectable degree of accuracy, even if the result were worth the labour. There is a certain interest attaching to this question of the proportion of the lost carbon in coal carbonization, however; because it rises into great prominence in connection with the carbonization of oil, which is the next raw material to coal for the manufacture of illuminating gas. All who have ever tried to carbonize oil for gas making in closed retorts, as coal is carbonized, have been confronted sooner or later with the difficulty of the wasted carbon. If oil, whether mineral or vegetable, is run into a retort and gasified, the hot surfaces on and in contact with which the process is effected are speedily coated with a deposit of carbon, which becomes graphitic if the heat is sufficient, and not only represents a serious loss of weight of material, but also prevents the satisfactory continuance of the manufacturing operations. A mineral oil which in a clean, hot retort will commence by yielding (say) 110 cubic feet of 70-candle gas per gallon will, if the process is attempted to be carried on continuously, drop in a very short time to a yield of not more than 60 or 70 per cent. of the first production, while the furnace will fail to keep the retort hot enough to prevent even worse results. If persisted in, the process would eventuate in a retort full of carbon, ranging all the way from graphite where it touched the walls, to loose greasy soot in the centre. Gasification would have meanwhile altered to the vaporization of a constantly diminishing proportion of the raw oil, until even this would cease. The technical history of oil-gas manufacture is a record of attempts to rectify this trouble, which is done in the production of Pintsch's gas by carbonizing the oil in the first stage in a metal tray placed loosely in the retort, and therefore easy to remove and clean. Notwithstanding this device, which is necessary in order that gasification may be conducted continuously in the same plant, the initial loss from deposited carbon, is, of course, constant, and averages nearly one-half of the weight of the raw material. There is a little tar produced when oil is carbonized; but this is the only true residual. The carbon thrown down in the retort is, of course, pure waste; and this waste is so great in the ordinary way of working, notwithstanding all the care that may be used to keep the retorts as clean as possible, that, as already remarked, the gas obtained scarcely weighs half as much as the oil consumed in its production.

Yet, with all its wastefulness, this was the only system of making illuminating gas from common mineral oil before the modern development of water gas was brought to a success by Lowe and his rivals and imitators. This development consists, as everybody knows, in the gasification of oil in immediate contact with the incandescent fuel of a water-gas generator, or in a current of the hot gases immediately after these leave the generator. The combination is called illuminating water gas, or more shortly water gas, with the qualification of luminosity left to be understood. Let us, for the purpose of this article, however, regard the resultant gaseous mixture as an oil gas, with its illuminating power diluted, and its bulk correspondingly increased, by the addition of a non-luminous but inflammable cheap diluent. The change of standpoint will give us some fresh ideas on the general subject. From this point of view, then, we see the generator as a means of gasifying mineral oil. If preferred, the water gas can be made in a generator, and afterwards used to dilute oil gas produced in a retort. This was, indeed, the earliest system of water gas working, and the employment of a combustile diluent was a great advance on the crude practice of letting down an unmanageably rich oil gas by an admixture of air. It was evidently a further improvement when the retort was abolished, and the oil gasified upon the same glowing mass of fuel from which the diluent was obtained. If nothing else was gained by the change, the consumption of fuel for heating the retorts and the prime cost of maintenance of this portion of the old plant were saved. Were there any other advantages, however? Was the production of gas from the oil consumed improved in quantity or in quality when the operation of gasification was shifted from the closed retort to the live fuel and hot current of gas from the generator? In other words, does the modern water-gas generator return a higher duty, regarded as a means of gasifying mineral oil, than a Pintsch's retort? This is a point not fully cleared up.

The question possesses practical importance, more particularly in connection with the future of the system of utilizing oil gas in which Mr. E. Tatham (whose process was described in the Journal a fortnight ago) is a pioneer. For it will be observed that, although Mr. Tatham proposes to burn his rich oil gas by the aid of oxygen, instead of diluting it with water gas or anything else detrimental to the illuminating power, he requires to make his gas first. If it is produced in the closed retort, he must submit to the loss incidental to that method of manufacture; but what if the oil is gasified on a bed of live coke? There is no necessity for the simultaneous production of a great bulk of water gas with the oil gas, but only for making just so much as may be required to prevent the oil from being burnt up in the glowing mass of fuel with such stray oxygen as may linger from the blowing-up operation. It is quite possible that the duty of a generator used in this way may not be much higher than a closed retort—a suspicion that gains colour from an examination of water-gas data. It appears, for example, that 3 gallons of petroleum, weighing about 25 lbs., go to the production of 1000 cubic feet of 22-candle gas. Now, if this oil were well carbonized in a clean retort, it would make 300 cubic feet of gas rated at about 70-candle power. Increasing the bulk of gas in this way therefore brings down the luminous value pretty much the same as would be the case if the lighting gas and the diluent were separately prepared. It would be satisfactory if Professor Lewes could clear up the doubt surrounding this question, by showing authoritatively how much of the weight of 1000 cubic feet of Steenbergh water gas, as prepared under his supervision for illuminating purposes, comes from the oil, which would give the ratio of loss, and how much from the coke, which would also indicate the proportion of fuel lost during the operation of "blowing up," on making producer gas. This would, in short, settle the point, now doubtful, of the comparative efficiency of retort and cupola for gasifying oil.

If it should appear, upon examination, that the wastefulness of a generator for oil is at all commensurate with that of a closed retort, it will go far to establish the deduction that the quickness with which the fluid form of hydrocarbon may be fractionally gasified, has to be paid for by an inevitable waste of carbon, which renders this form less desirable economically than the solid form, although the latter is not so tractable. It would be noteworthy if it should be shown that coal is, after all, the least wasteful form in which a gas-making material is obtainable; and, from what can be learnt at present, such a conclusion is distinctly probable. Oil may be so low priced in some localities that the unavoidable loss of half its weight in the process of gasification may be commercially insignificant; but the idea would nevertheless remain to irritate engineers, and perhaps to inspire inventors with vain hopes of the possibility of more economical methods.

The Frankfort Electrical Exhibition, which was to have been held this year, has been postponed until 1891. A new prospectus has now been issued, from which we find that Class I. is to comprise gas and other motors.

The Gas-Fittings in the New Guildhall, Londonderry.—Messrs. J. Milne and Son, of London and Glasgow, have just completed an important installation of special gas-fittings in the New Guildhall, Londonderry, recently opened. The larger hall is lighted by three magnificent polished brass coronæ, with massive iron and brass wall brackets to match. In the smaller apartments, brass and iron coronæ have been introduced; while some very special corridor lamps and wrought-iron entrance lanterns complete a somewhat unique and very successful installation of original designs in open-flame gas lighting.

ACCOUNTS OF THE METROPOLITAN GAS COMPANIES FOR THE YEAR 1889.

—	Chartered.	Commercial.	South Metropolitan.	All the Companies.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Capital and borrowed money	10,690,900 0 0	810,000 0 0	2,849,996 0 0	14,350,896 0 0
Income—viz.:				
Sale of gas by meter	2,151,045 1 5	212,476 16 4	586,702 6 5	2,950,224 4 2
Public lighting, including lighting and contracts	136,647 9 8	17,955 15 4	55,826 5 3	210,429 10 3
Rental of meters and stoves	58,341 8 1	4,581 7 10	17,747 9 11	80,670 5 10
Residual products	815,404 6 2	86,188 16 6	247,664 13 3	1,149,257 15 11
Miscellaneous, including old materials	12,578 18 6	623 11 7	4,538 18 0	17,741 8 1
Total income from all sources	3,174,017 3 10	321,826 7 7	912,479 12 10	4,408,323 4 3
Expenditure—viz.:				
Coals, including carriage and dues	1,131,140 13 9	119,963 11 7	342,096 11 3	1,593,200 16 7
Purifying materials, including labour	58,400 0 7	6,391 6 11	15,953 2 9	80,744 10 3
Salaries and wages—manufacture	306,395 7 9	33,322 18 9	109,166 4 4	448,884 10 10
Wear and tear—manufacture	260,296 8 8	23,391 17 7	76,370 4 2	360,058 10 5
Rents, rates, and taxes	163,381 10 8	10,025 4 3	42,465 5 1	215,872 0 0
Salaries—management	14,925 2 6	2,121 9 0	4,071 12 8	21,118 4 2
Collectors' salaries and commission	29,071 4 10	3,173 16 10	10,605 2 2	42,850 3 10
Stationery, printing, and general charges	10,847 13 6	1,567 10 11	7,476 15 0	19,891 19 5
Directors and auditors	5,900 0 0	2,650 0 0	3,725 0 0	12,275 0 0
Salaries and wages, wear and tear—distribution	126,918 13 1	12,812 4 1	43,447 4 0	183,178 1 2
Repair and renewal of meters and stoves	52,948 9 2	3,900 13 10	12,784 6 0	69,633 9 0
Law and parliamentary charges	5,778 7 4	183 18 0	2,735 6 3	8,694 11 7
Bad debts and extraordinary expenses	36,890 13 0*	3,980 17 6	37,627 10 11†	78,499 1 5
Total expenditure on revenue account	2,202,894 4 10	223,485 9 3	708,524 4 7	3,134,903 18 8
Gross profit	971,122 19 0	98,340 18 4	203,955 8 3	1,273,419 5 7
Do. per cent. on capital and borrowed money	9 1 8	12 2 10	7 3 2	8 17 6
Do. do. gas-rental	42 9 0	42 13 6	31 14 10	40 5 10

* Including £18,060 16s. 9d. annuities.

† Including £30,349 15s. 9d. strike expenses.

TABLE *showing the Capital, Income, Expenditure, and Profit, per Ton of Coal carbonized, in* 1889.

—	Chartered.	Commercial.	South Metropolitan.	All the Companies.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Capital and borrowed money	5 13 11·96	4 0 10·86	4 14 8·56	5 7 2·25
Income—viz.:				
Total gas-rental	1 4 4·72	1 3 0·20	1 1 4·23	1 3 7·29
Rental of meters and stoves	7·46	5·49	7·09	7·23
Residual products	8 8·34	8 7·30	8 2·77	8 7·01
Miscellaneous, including old materials	1·61	0·75	1·81	1·59
Total income from all sources	1 13 10·13	1 12 1·74	1 10 3·90	1 12 11·12
Expenditure—viz.:				
Coals, including carriage and dues	12 0·73	11 11·79	11 4·43	11 10·80
Purifying materials, including labour	7·47	7·66	6·36	7·24
Salaries and wages—manufacture	3 3·20	3 3·94	3 7·54	3 4·23
Wear and tear—manufacture	2 9·31	2 4·04	2 6·46	2 8·27
Rents, rates, and taxes	1 8·91	1 0·02	1 4·93	1 7·35
Salaries—management	1·91	2·54	1·62	1·89
Collectors' salaries and commission	3·72	3·80	4·23	3·84
Stationery, printing, and general charges	1·39	1·88	2·98	1·78
Directors and auditors	0·75	3·18	1·49	1·10
Salaries and wages, wear and tear—distribution	1 4·24	1 3·36	1 5·32	1 4·42
Repair and renewal of meters and stoves	6·78	4·57	5·10	6·24
Law and parliamentary charges	0·74	0·22	1·09	0·78
Bad debts and extraordinary expenses	4·72	4·77	1 3·00	7·04
Total expenditure on revenue account	1 3 5·87	1 2 3·87	1 3 6·56	1 3 4·98
Gross profit	10 4·26	9 9·87	6 9·34	9 6·14

TABLE *showing Increase or Decrease in each Item during* 1889 *compared with* 1888.

—	Chartered.		Commercial.		South Metropolitan.		All the Companies.	
	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.
	£	£	£	£	£	£	£	£
Capital and borrowed money	..	..	110	..	126,563	..	126,673	..
Income—viz.:								
Sale of gas by meter	..	99,724	..	6,053	..	35,617	..	141,393
Public lights, including lighting and contracts	3,680	..	99	..	..	1,430	2,348	..
Rental of meters and stoves	2,266	..	..	844	1,830	..	3,252	..
Residual products	115,123	..	6,849	..	19,340	..	141,312	..
Miscellaneous, including old materials	1,794	..	..	258	..	399	1,136	..
Total income from all sources	23,139	..	..	207	..	16,276	6,655	..
Expenditure—viz.:								
Coals, including carriage and dues	52,654	..	2,798	..	24,217	..	79,669	..
Purifying materials, including labour	5,649	..	426	..	1,866	..	7,940	..
Salaries and wages—manufacture	45,843	..	1,871	..	23,794	..	71,509	..
Wear and tear—manufacture	25,449	..	4,260	..	955	..	30,665	..
Rents, rates, and taxes	8,045	..	379	..	5,625	..	14,049	..
Salaries—management	213	..	43	..	..	648	..	392
Collectors' salaries and commission	..	33	60	..	133	..	160	..
Stationery, printing, and general charges	843	..	..	210	..	24	609	..
Directors and auditors	..	..	..	..	..	..	..	..
Salaries and wages, wear and tear—distribution	6,409	..	307	..	..	3,419	3,297	..
Repair and renewal of meters and stoves	18,462	..	586	..	4,305	..	23,354	..
Law and parliamentary charges	3,003	..	..	..	1,913	..	4,913	..
Bad debts and extraordinary expenses	..	4,647	133	..	31,001	..	26,488	..
Total expenditure on revenue account	161,889	..	10,653	..	89,719	..	262,261	..
Gross profit	..	138,750	..	10,860	..	105,995	..	255,606
Do. per cent. on capital and borrowed money	..	26s. 0d.	..	26s. 10d.	..	84s. 6d.	..	37s. 6d.
Do. do. gas-rental	..	82s. 3d.	..	70s. 5d.	..	277s. 4d.	..	120s. 11d.

NOTES.

Precautions in Theatre Lighting.

In treating of the lighting of theatres and similar places of amusement, the *Builder* recently remarked that no precaution should be omitted that would tend to mitigate the dangers arising on the stage, where the greatest risk is to be met with. The use of electric lighting, under due precautions, is believed to have reduced the danger in many instances; but it is acknowledged that there are still hundreds of houses where an immense quantity of gas is used nightly—too often in a careless manner. As the pipes are continually being disconnected and connected during a performance, small leaks are apt to occur near naked lights, which makes it remarkable that accidents are not more frequent. It is suggested that all gas-lights should be protected by wire guards, and that the lighting arrangements should be under the control of an expert, with a sufficient staff of assistants. This man, during the whole time that the house is open, should be stationed at the indicating plate fixed on one side of the stage near the curtain—on which plate every cock should be distinctly labelled, naming the system of burners governed by it, so that a mistake might, as far as possible, be prevented. When lights are seen to be turned up, lowered, or put out unnecessarily and in the wrong part of the house, the audience are apt to take alarm. The meters should be kept in a specially prepared and ventilated vault; and all the pipes should be of hard metal, left visible, and painted to prevent corrosion. There should be a stopcock on the service-pipe in the street, near the stage door, where the key should be kept, with a view to cutting off the gas from the house in case of fire. Separate meters should be fixed for every section of the house; and where frequented by the public a dual system should exist. Sun-burners are preferable to gaseliers, on account of their assistance in ventilating the house; but these and all other burners should be periodically examined and cleaned. The "flies" should be specially ventilated by means of shafts immediately over the "gridiron," with gas-jets burning in them to maintain an up-draught.

Testing Wells for Contamination.

Professor Lucien J. Blake, of the Kansas University, suggests a method for determining whether wells are contaminated from neighbouring sources of pollution. This is a matter in which sanitarians are greatly interested, and it also affects gas manufacturers and others, who are frequently charged with spoiling wells in the vicinity of their works. Professor Blake remarks that the eye and the sense of taste do not form any reliable testing instruments for water contamination; and chemical analyses are costly as well as requiring time. Accordingly, several quick methods for detecting communication underground between a source of pollution and a well have been suggested, but so far with doubtful results. A solution of an aniline dye has been tried for this purpose, but abandoned on account of the difficulty of recognizing the colour in the weak solution in which it would appear in the well. Again, a quantity of salt has been dissolved in the suspected source of contamination, and the well water afterwards examined for chlorine by the sense of taste and by chemical analysis, but without satisfactory results. It therefore occurred to the writer to try what could be done with spectrum analysis, which is understood to be capable of detecting the presence of a 180-millionth part of a grain of sodium or a 40-millionth part of a grain of lithium. Accordingly, in an instance of suspected pollution of a well, a solution of carbonate or chloride of lithium, in the proportion of one ounce to a quart of water, was poured into the suspected source of contamination, and after about a week the well water was examined by the spectroscope. Lithium gives a characteristic and unmistakeable red band towards the remote red end of the spectrum. The sensitiveness of the test is greatly increased by boiling down the water to be examined; concentrating (say) a quart to half an ounce. A platinum wire is dipped into the water so prepared and the drop held in the flame of a Bunsen burner. Nine wells in the town of Lawrence were tested in this way; and in one case connection was shown to exist with a cesspool at a distance of 30 feet—which, by the way, might reasonably have been expected on account of the proximity. Professor Blake thinks that this method of examination for well pollution is as reliable as it is certainly easy.

Bricks from Coke.

The use of coke, coke dust, or graphite from gas-retorts in the manufacture of refractory bricks for lining iron furnaces seems like a contradiction of nature; but it appears from several communications to a recent meeting of the Society of German Iron Manufacturers that an industry in the manufacture of such bricks for iron-works is actually established, and is growing. Hitherto nothing has been found capable of withstanding the corrosive action of blast-furnace slag, which is alternately acid and basic, and carries away the lining of the hearths of the furnaces as though it possessed no resistance, although, as a matter of fact, everything is done to prevent this action. The best refractory materials, if placed in the way of a current of slag, will completely melt away in an hour or two. The observation that slag runs best in a channel of coke or coal ash turned attention to this material for lining furnaces; and Mr. F. Burgess, of Gelsenkirchen, states that in his first experiments in 1883 he tried a combination of coal, coke dust, graphite, and clay, moulded in the form of bricks. Unfortunately, in the process of burning these carbon bricks, the carbon largely burnt out; but even so they gave satisfactory results. The process could not be patented because it is on record that furnaces in the Hartz Mountains have been lined with a similar combination of coke dust and clay. It appears also, from a paper by M. Purcel, that in a certain district of France the hearths and bottoms of furnaces have for some years been lined with graphite brick. The raw material of these bricks was gas-retort graphite, ground and mixed with tar and then calcined. Part of the tar is coked, and binds the graphite into hard and durable bricks. Coke poor in ash treated in the same way yields good results. These bricks give satisfaction in furnaces which are severely pushed. The cost is about £5 per ton in Germany.

COMMUNICATED ARTICLE.

ELECTRICITY IN BOSTON, U.S.A.

By an American Correspondent.

In my previous article (*ante*, p. 489) I dealt with the interest which has lately been taken by the citizens of Boston in things electrical, and alluded to the fears experienced by a portion of the community at the rapid extension of electric light wires throughout the streets. In the present article I will deal with the muddle the city is now in, relative to the contract for lighting the streets with arc lights.

The work of lighting the city streets has been, hitherto, and in fact is now performed by the Boston Electric Light Company. This Company was formed a few years ago, by the consolidation of the four Companies then engaged in the electric light business in Boston, since which time the Consolidated Company has had a monopoly thereof; or perhaps I should say they have had all the arc light business in the city proper, while most of the incandescent work has been done by the Edison Company. The Boston Company have had the contract of the city proper for such arc lights as were desired (the number being about 900) at 65c. per night; the lights being of 2000-candle power nominal, and burning all night. The Charlestown Gas Company supply in their section of the city about 100 lights, and receive for the service the same price as the Boston Company. An additional number of arc lights are furnished by the Brookline Gas Company in the suburbs of the city in its direction, for which the sum of 50c. per night is received. These prices were considered by a good many people to be high; and certainly, when compared with those at which arc lights are supplied in other cities, the criticism would seem just. On the other hand, the managers of the Boston Company claim that they have spent very large sums in their outside work; that their line-work has been of the very best construction, and is kept in excellent repair; that their stations are costly and well equipped; and, further, that it costs them 47c. per night to produce an arc light. Be this as it may, the price was thought to be high; and when it came to be known that the contracts for street lighting would expire at the beginning of this year, there was considerable talk in favour of getting lower terms. In due course, the city advertised for new bids for lighting the streets (this was quite early in the year). In reply to the invitation, the Boston Electric Light Company sent in their stereotyped offer—65c. per night; the same figure being made by the Charlestown Gas Company. As these Companies had warning of the trouble ahead, it seems strange that they should not have seen their way to making some concession; but they did not, and consequently the offers were rejected, and the Mayor asked for new bids not to exceed 40c. per night. To this invitation the Boston Company did not respond. The Charlestown Gas Company offered to light their portion of the city for 40c. per night for each arc; and a proposition was received from the Suburban Light and Power Company, agreeing to furnish arc lights in the city proper for 39·74c. per light per night, and in Roxbury district for 37·99c. As at these figures the saving to the city over the price which had been paid to the Boston Company would be $73,000 a year, it was very natural that the Mayor should accept the proposition; and this he did very promptly.

The question now arises: Who form the Suburban Company? To answer this I shall have to go back a little. In 1886 the Brookline Gas Company were engaged in a rather hot fight with an electric light company which had been formed in that town. Brookline, it must be remembered, is not part of Boston, though it is really included in the geographical disposition of the city. That is to say, the suburban towns lying in and around Brookline have come in and formed part of the city of Boston; but Brookline has preferred to retain its independence, and so the town is surrounded by the city on all sides, yet does not form part of it municipally. As the Brookline Gas Company progressed in their fight with the electric light company, they felt it would be an advantage to fight electricity with electricity. But as at that time gas companies had not been authorized to go into this new business, the Suburban Light and Power Company was formed by parties interested in the Gas Company; and, in addition to getting rights in Brookline, they also obtained permission to run wires within the territory of Boston, for the

purpose of lighting Brighton and other parts of the city. Later the Gas Company bought out the opposing Electric Light Company; having obtained permission to go into the electric light business under the Acts of 1887. They also absorbed the plant of the Suburban Light and Power Company; and I think it was generally supposed that the latter Company had thus gone out of existence. But apparently it had not. For another chapter in this history we must go to Roxbury—a part of Boston adjoining Brookline. The residents of this portion of the city felt that they did not receive from the Boston Electric Light Company that service to which they were entitled. Several of them therefore joined together, and formed the Roxbury Electric Light Company; paying in $50,000 of capital. But failing to obtain from the Aldermen permission to put up wires and poles in the streets of the city, or that portion of it known as Roxbury, they appealed to the Board of Gas and Electric Light Commissioners, who, under the Acts of 1887, have the final word in such matters. The Board upheld the action of the Aldermen; and consequently the Roxbury Electric Light Company could do nothing but submit. This they did as gracefully as was possible; and returning to the subscribers the $50,000 paid in, the concern was wound up.

The third chapter of the story, which has been somewhat anticipated by me, is laid in the early part of last January. Then the gentlemen who had formed the Roxbury Company, perceiving that the Mayor and the Boston Company were at loggerheads, looked around for some means to take advantage of the "pretty quarrel;" and finding the before-mentioned partly-absorbed Suburban Light and Power Company, bought the stock and such rights as they had, and put in the bids as before mentioned. The reason for trying to take advantage of the rights of the Suburban Company is explained by the following fact. Had they formed a new Company, they would have had to obtain permission from the Aldermen and the Gas and Electric Light Commissioners before they could erect poles and wires in the city; but as the rights of the Suburban Company ante-dated the creation of the Commissioners, they thus avoided going before the Board. It was thought that if the city agreed to their offer, the Aldermen would, as a matter of course, give them the necessary rights to lay wires, &c. But no sooner had the Mayor accepted the bid of the Suburban Company than the trouble commenced. The Company had agreed to have their station ready in six weeks; and its erection was immediately commenced. When it was clear that the Mayor was in earnest, and intended to obtain electric lights at less cost, the Boston Electric Company intimated that they might be willing to accept a less figure than 65c.; and, moreover, efforts were made to show how grave a danger threatened the city in the shape of an additional 500 miles of electric light wires. This "racket" was worked for all it was worth. Fire underwriters joined in petitioning the local Government to save the place from this untoward evil; and the papers were full of the disasters which were to befall the fair city of Boston if this new Company were to be permitted to string their wires. It soon transpired that the Suburban Company were to use the Westinghouse system, and that the wires in the most thickly-settled portion of the city were to be buried. Then the cry arose that underground wires were not, so far, a success; and so on. Finally, the application of the Suburban Company for permission to lay their wires came before the Board of Aldermen, and a very hot fight was the result. The matter was first referred to the Committee on Electric Wires; and, after extended hearings, the majority reported in favour of the Suburban Company—a minority report being against granting their petition. The matter was then taken before the full Board of Aldermen; and the Suburban Company had to encounter not only the Boston Electric Light Company, but the Edison Company as well, which feared the advent of this new Westinghouse Company. After a very bitter fight, it was finally voted not to grant the rights asked. So we have the peculiar position of a city making a contract with a Company to light its streets, and then refusing to give them the necessary means to carry out the contract. The matter, however, does not end there; for the Suburban Company next applied to the Courts for a *mandamus* to compel the Aldermen to grant their prayer. After some delay the application was denied; but an appeal has been lodged, on which a decision has not as yet been rendered. In the meantime, the Suburban Company have gone on and completed their station; and they are now threatening the city with a suit for damages. What the outcome will be, cannot now be stated; but there are rumours of forthcoming "deals." One thing, however, is pretty well acknowledged, which is that the Suburban Company are going to continue fighting as long as there is a fighting chance. In the meantime, the Boston Electric Light Company are continuing the lighting at the old rate of 65c. per night. But the end is not yet.

Death of Mr. A. Wilson, of Cape Town.—We regret to record the death, on the 11th ult., in his 78th year, of Mr. Alexander Wilson, who for the long period of 45 years held the position of Manager of the Cape Town Gas-Works. The respect in which the deceased was held was testified by the large attendance at the funeral; the Chairman and Directors of the Gas Company, many of the workmen, and a considerable number of friends, being present.

TECHNICAL RECORD.

NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

The Twentieth Annual Meeting.

(*Continued from p.* 546.)

Mr. WALDO A. LEARNED, of Newton (Mass.), read a paper on the "Revivification of Oxide of Iron." He objected to the use of air with the gas, as likely to reduce the candle power and to cause heating and back pressure in the purifiers. In July, 1887, he tried this plan, and ran his purifiers six weeks without change, purifying 19,600 cubic feet of gas per bushel of oxide; but he had to use an enricher to make up for the reduction in candle power. He thought that oxygen might be used instead of air with advantage, if the purifiers were large, the oxide of good quality, and the gas not too rich in sulphuretted hydrogen. The forcing of air through the boxes, after taking them out of circuit, was attended with some risk of fire and bursting of the boxes by expansion. He had adopted the plan of drawing, not forcing, air through the material. A home-made steam jet exhauster, consisting of a 3-inch by 2-inch cast-iron reducer, with a ½-inch steam-pipe tapered at the end, was attached to the inlet-pipe by a 3-inch pipe, and the pipe was continued through the roof of the building. The purifiers were 12 feet by 16 feet, fixed in series with a centre valve. He used Irish bog ore, which purified 3500 cubic feet of gas per bushel, and also a prepared oxide, known as "sponge," which would purify 4500 cubic feet of gas per bushel. The sponge was made on the works, and consisted of 15 lbs. of iron filings, 10 lbs. of sal ammoniac, and 1 lb. of copperas, to a bushel of coarse sawdust or shavings. The latter were first wetted with silicate of soda and water, to render them less combustible. The copperas was not needed unless ammonia was present in the gas. A layer of coke breeze was spread on the bottom row of grids, then 18 inches of oxide, and a tray with 3 inches of lime on the top. He used the lime to take out carbonic acid; and did not agree with those who thought it was cheaper to enrich the gas than to take out this impurity. When the box was foul the cover was removed, the lime taken out, and the steam jet started at a vacuum of about 0·2 inch, according to the density of the material; and in four to six hours it was completely revivified. It was then necessary to turn the material in the box, to maintain its porosity; and after each revivification it became more dense. He objected to the use of steam with the air in the purifier, as likely to increase the temperature; but admitted water at the bottom of the box, for the purpose of keeping down the temperature, with advantage.

The President called upon Mr. Neal to open the discussion. That gentleman said he had tried revivification *in situ* by injecting steam, with the result that he set fire to the wood grids, and created an intolerable smell. For some time past he had used a "sponge" very similar to that mentioned in the paper, and found that it varied very markedly in effect, ranging from 2000 to 18,000 cubic feet in purifying capacity per bushel. The sulphuretted hydrogen to be removed, however, varied considerably, ranging from 6 to 17 grains per cubic foot of gas. He was using Mr. Learned's plan of revivification; but even with that there was a great deal of heating in the purifier, especially with new oxide. He could revivify in about four hours; and after that it was his practice to take the oxide out of the purifiers, turn it, wet it thoroughly, and then put it back. His purifiers were rather small, so that it was necessary to apply a jet exhauster at the outlet, to prevent undue pressure at the inlet; and he should explain that he made water gas as well as coal gas, and mixed the gases at the inlet of the purifier. He used a layer of the coarsest sawdust obtainable at the bottom of the purifier, and spread bagging over it to keep the oxide from mixing with it. The sawdust should be made from pine, and not from hard wood. Mr. Stedman said he had endeavoured to get as much iron as possible in the purifier, and found that he could not go beyond 30 lbs. of iron per bushel of sawdust. He tried various plans of revivifying *in situ*, of course with the usual trouble from heating; and had found that by blowing in a good fierce blast of air, he could keep the temperature down. A reasonably high temperature answered best; and if it became too high it could be reduced by increasing the air supply. The large blast of air had the effect of drying the oxide; and to prevent this from going too far, he admitted waste steam into the purifier. Working with careful attention to the temperature, he was able to apply this system successfully. The scrubbing plant was too small, so that a quantity of tar passed on to the purifiers. This was absorbed by a layer of breeze at the bottom, and necessitated taking the oxide out oftener than would otherwise be necessary. Mr. W. A. Wood preferred to draw the air through the material by applying an exhauster at the inlet, as proposed in the paper. This was not so likely to unduly heat the material as driving the air in. His experience agreed with that of the author of the paper; and he found it sufficient to turn the oxide in the boxes once in every four or five revivifications. Mr. Spaulding agreed with Mr. Wood; and Mr. Allyn had found that Mr. Stedman's plan, of admitting more air to reduce the heat, was correct in practice.

Mr. N. W. GIFFORD, of New Bedford (Mass.), gave an account of some experiments tried with an open type of photometer, 100-inch, in a dark room 7 feet by 15 feet. It was so arranged

that gas or candles could be used at either or both ends, and the standard of comparison used was a Methven unit. The air supply to the burner could be taken from a small holder at a regulated rate, if desired. The following was the effect of regulating the air supply:—51 cubic feet per hour gave 15·22 candles; 46 feet, 15·97 candles; 42 feet, 17·10 candles; 38·1 feet, 17·38 candles; 35·3 feet, 17·82 candles. Although an analysis showed that the theoretical requirement was 5·64 cubic feet of air per cubic foot of gas, the flame began to smoke when the air supply was reduced below 35 cubic feet. The effect of aqueous vapour in the air upon the illuminating power was shown by passing a similar quantity of air to that used in No. 4 experiment through a desiccator, when the illuminating value was raised to 18·34 candles. As the air supply is greatly influenced by the diameter and height of the chimney, it follows that when the flame decreases, either on account of diminished consumption or a poorer quality of gas, the air supply is not decreased in the same ratio. A 16·75-candle gas used 44·2 cubic feet of air per hour; and a 15·62-candle gas, 42·2 cubic feet of air. The surplus above that required by theory was the same in both cases; so the weaker gas had as much cooling to contend against as the stronger. Some experiments were tried with chimneys of uniform diameter but of different lengths, on a sample of gas. With a 6-inch chimney the illuminating power was 17·64 candles; 6¼-inch, 17·34 candles; 6½-inch, 17·17 candles; 6¾-inch, 16·82 candles; 7-inch, 16·40 candles; 7¼-inch, 16·37 candles. This shows that the disadvantage to which the poorer gas is exposed may be overcome by adjusting the length of the chimney so as to avoid excess of air supply. Another way would be to increase the consumption as follows:—

		Candles.		Candles.
Gas burning	4·50 cubic feet per hour	indicated 12·19,	corrected	13·40
,,	4·75 ,, ,,	14·72	,,	15·85
,,	5·00 ,, ,,	15·82	,,	15·82
,,	5·25 ,, ,,	16·88	,,	16·03
,,	5·50 ,, ,,	18·29	,,	16·46

At the higher consumption, this showed a gain of 0·64 candle, or more than 4 per cent.; and it was a question whether it did not more truly represent the value of the gas.

A paper on the "Difference in the Eastern and Western Methods of Management of Gas-Works," by Mr. E. G. Pratt, of Des Moines (Iowa), recorded some of the experiences of the writer on this subject. In the West they were more scattered, and therefore subject to considerable cost for carriage. Not only so, but it was not possible to get coal, pipes, or anything needed at twelve hours' notice, as could be done in the East. So the gasman of the West had to take more "thought for the morrow" than his brother in the East. The Western man had also to pay more for labour, not because there was a greater demand, or that the cost of living was greater, but because the Western labourer was more independent, and more liberal in his expenditure. He was also wasteful; and this bad habit sometimes spread all over the gas-works. The Eastern gas manager generally took a pride in keeping his works in proper order; but in the West so much attention was not given to the condition and appearance of things about the works. The management was directly responsible for this condition of things, and it could be obviated at no greater expense in the end. Notwithstanding all the extra expenses, gas was sold at practically the same price in the West as prevailed in the East. If all the companies were making coal gas, he should account for this by the increased value of residuals in the East. The price of coke was regulated by that of hard coal; but the demand for tar was such that there was no difficulty in disposing of the entire make at good prices. Many of the larger works in both sections of the country, however, were now equipping themselves with water-gas plant; and this doubtless had the effect of increasing the value of the residuals by lessening the supply. One advantage peculiar to the West was the supply of cheap coal, which if not suitable for gas yielding, was certainly economical for fuel purposes, when used in specially-adapted furnaces, as it enabled the entire make of coke to be sold. At some of the Western works a large percentage of these native coals could be used in the retorts, as when mixed with Youghiogheny, Penn., or Westmorland coal, they gave very satisfactory results both in respect to quality and quantity. The condition of the soil rendered main-laying cheaper in the West, even though in some instances the pipes were laid deeper. The immediate consumption per mile of main was not so great, becaue the cities were growing rapidly, and it was necessary to provide in advance for the prospective requirements. Frequently improvements were carried out that necessitated alterations in the position of the mains; and in many Western cities the leakage account was high, probably on account of much of the main-laying being done by contract. The consumers' views are much the same as elsewhere; and if they read of a new process for making gas at 2½d. per 1000 cubic feet, they want to know why the local company do not adopt it. There are more schemers who live by their wits in the western country than in the east; and as franchises are easily obtained, it is necessary to be continually on the alert against competition. The electric light was doing well in the West, and had seriously injured the business of gas companies in small towns, unless they had been far-sighted enough to establish an electric light plant of their own, and so keep out the competition. In the larger cities the sale of gas continued to increase; but many were contemplating the necessary plant to supply either gas or electricity as might be preferred.

A paper entitled "Why I Should Make Water Gas" was next read by Mr. A. B. Slater, of Providence, R.I. He thought the feelings of opposition to water gas were not engendered by the gas itself, but by the aggressiveness displayed by early patentees and advocates in forcing its introduction by very questionable methods. The objection to carbonic oxide had now practically dropped out of sight. With the exception of two States, there was no objection to its distribution; and by far the greater portion of the gas made and distributed in the larger cities of the country was water gas. There was practically no objection on the part of the public; so the question was at once reduced to the simple one of £ *s. d.* As applied to the distribution of uncarburetted water gas, which contained 45 per cent. of carbonic oxide, and was almost odourless, the old objections retained all their force. The manufacture of water gas got rid of all the labour, care, and trouble of the disposal of residuals, which was quite a burden at a large coal gas works; and the question of the disposal of the residuals occupied a prominent place as regards the policy of adopting water gas either in whole or in part. The question of the cost of water gas as compared with coal gas depended chiefly on the relative prices of gas coal, enriching materials—cannel, crude oil, naphtha, &c.—cost of carbonaceous material for generators, prices realized for residuals, and rates of wages. He had adopted water gas as an auxiliary to coal gas for several reasons. It offered a material saving in the cost of the gas. He could keep a regular number of retorts continuously in use making coal gas, and rely on the water-gas plant to meet variations in demand, thus saving the extra labour and expense involved in missing charges, &c. He reduced the make of coke and also that of tar, and would thus be able to obtain better prices, and expected to net as much for the lessened quantities as had been secured for the whole. The price of tar was already largely advanced by the lessened production due to the extensive adoption of water gas in large cities. Then there was the important fact that a good water-gas plant could be operated with one-third or one-fourth of the labour necessary in a coal gas works. The risk of annoyance and trouble from labour disputes was thus reduced. He intended to keep both kinds of plant fully up to the mark, so as to be able to work either or both as might be most advantageous, as prices of materials and other items varied from time to time.

Mr. F. H. Parker, of Burlington (Vt.), followed with a paper on "A Few of the Advantages of Water Gas over Coal Gas, for Small Works." When the writer took charge of the gas-works at Burlington in 1877, he found a good modern coal-gas plant, comprising four beds of five retorts and one of three, with good purifying and storeage capacity. The cost of Westmorland coal was about 28s. per ton; the yield of gas averaged 10,750 cubic feet per ton; and the selling price was 16s. 8d. to 17s. 10d. per 1000 cubic feet. Much dissatisfaction prevailed at the high price of gas; nor was this remedied when, by slightly increasing the yield per ton, using the tar (which was almost valueless) as fuel, and other small economies, the price was reduced to 12s. 6d. and 15s. As the sale did not increase, but rather the reverse, and no further reduction in cost was possible, a Lowe water-gas apparatus was put in. This enabled the price to be gradually reduced until it reached its present limit of 6s. 8d. to 9s. 3d. per 1000 cubic feet; and the demand now showed a very satisfactory increase. Comparing the water gas with the coal gas process, there was not the trouble with naphthalene, thick tar, stopped pipes, dirty or broken retorts, frozen service-pipes, occasional accumulations of coke, and other difficulties experienced in a locality where the cold of winter meant 6 feet of frost in the ground. With water gas, there was no naphthalene, very little tar, only one stand-pipe to keep clean, no retorts, lids, or hydraulic mains, less labour was required, the gas could be made at any time in the day or night, so that in the summer it was sufficient to fill the holders up once every two or three days, the generator room could be kept very much cleaner than the retort-house, and the cost of repairs was very low. The detection of leaks, too, was easier than with coal gas; so that he had been able to reduce the loss by unaccounted-for gas. And water gas was less liable to be affected by the severe cold of winter. As much as 70,000 cubic feet per day had been made with a generator 5 feet by 10 feet, by one man only.

The President remarked that the first paper on water gas was written by a manager of a works making 460 millions, and the second by the manager of a works making 10 million cubic feet per annum, thus showing its applicability to both large and small works. Mr. Prichard said that he had found a water-gas plant very useful to meet irregularities in demand, when the retort-house was worked to its full capacity. The cost of water gas was about the same as that of coal gas with him. His water-gas apparatus was one of the old-style Grainger pattern, with shallow generator and single superheater; and he could not use Lima oil without sending the vapours all over the district. He had to use naphtha which cost 3d. per gallon, whereas the Lima oil could be had at half the price. Mr. C. J. R. Humphreys, of Lawrence, had adopted water gas to meet the variable demands of a factory district, and thus avoid the expense of keeping a lot of retorts under fire. The water gas also afforded a cheap means of enriching his coal gas. He made a 28 to 30 candle water gas, and used that instead of cannel. He hoped soon to use coke alone in the generators, though hitherto he had used part coal; and the water gas was

cheaper than coal gas. He enjoyed the advantage of being able to use the Lima oil, and found the consumption to be about 5 gallons per 1000 cubic feet of gas made. He used two small holders of 20,000 cubic feet capacity each, as store vessels for the water gas, and delivered it at the inlet of the coal gas condensers as required. At present the quantity so admitted was about 12 per cent. of the whole. Mr. Anderson having raised the point of whether the use of water gas did not produce condensation in the dry meters, which necessitated more frequent replacement of the diaphragms, Mr. Shelton said that had been known to happen; but that if the water gas was properly made and fixed, nothing of the sort would be experienced. A large amount of condensation resulted from water gas made with some of the older forms of apparatus; but with proper modern apparatus there was no more condensation than from coal gas, and the meters lasted quite as well. Mr. Slater said that he had an extra holder of 280,000 cubic feet capacity, for the water gas. It went direct from the generator to this holder, and was drawn in by the exhauster to the coal-gas apparatus as required. He used Lima oil, in quantity 3½ to 4½ gallons per 1000 cubic feet of gas; but was not working the water-gas plant to its fullest capacity. Indeed, it was only used occasionally.

"Various Methods of Introducing Gas-Stoves," formed the subject of a paper by Mr. H. A. Norton, of Boston (Mass.), who insisted on the importance of proper attention to this department of gas consumption, and of offering every facility in the way of letting stoves on hire, &c. He said that many companies charged rents after the rate of 25 per cent. on the price of the stove, and collected the amount every year. The cost of putting out 1000 gas-stoves would average about £3600; and they would consume 10,000 cubic feet a year each, or 10 millions on the whole. At a profit of 2s. per 1000 cubic feet, they would yield £1000 per annum from gas used. So under some circumstances, it might be worth while to incur some loss in introducing the stoves. Certain companies had found a house-to-house canvass helpful; others had experienced benefit from lectures on cookery, and the inducement of a low price—or failing that a special rate for day gas—was a great help.

Mr. Slater said he started three years ago, selling stoves at cost, or letting them on hire at a moderate rent. The result was he had more than 2600 stoves out, which would not use less than 20 million cubic feet of gas per annum. He had no special rates for gas, only one price—at present 5s. 10d.—and about 70 per cent. of the stoves were put out on hire. The stove business was made a special department, with a show-room in a main street, under the charge of a competent man, but there were no canvassers. The stoves were fixed free of cost. Mr. Todd said that in small towns he had found an exhibition of appliances, with a free lunch cooked by gas, a good help in increasing day consumption. At Middleton (N.Y.) he had put out more than 80 stoves in two years. He fixed stoves on trial free of cost, and either sold them at cost price, or let them on hire at 20 per cent. on the net cost. Mr. Harbison had been successful in the gas-stove department at Hartford. His plan had been to keep all sorts of stoves on hand, to have them thoroughly tested, and then sell them by personal solicitation. He sold gas at 5s. 10d. per 1000 cubic feet, and even as low as 5s. 2d. to large consumers; had more than one stove to every four meters; and the day output was about 20 per cent. of the entire consumption. He sold the stoves at cost, and also fixed them at cost price; but did not believe in losing money in order to get custom, or in giving away anything. A guarantee was given with each stove. One difficulty had been the high price of the stoves; but this was gradually being met. A good show was kept up, and two or three of the clerks were well posted up as to the merits and capabilities of the various stoves. He had now more than 1700 stoves in use, and intended to employ a canvasser when he could meet with the right man, who, however, was hard to find. Every gas manager ought to devote a certain proportion of his time to the selling department. With regard to the demand for a water heater, to provide a good supply of hot water for washing, an appliance of the sort was now in the market. Mr. Woodward had tried hiring out stoves; but found that every hirer expected a new stove, and therefore discontinued the plan, now only selling them. He had 250 stoves out. Last year he gave away 50 small stoves; but found that this was not altogether a good policy, as in some cases it prevented people from getting larger ones.

Mr. S. J. Fowler, of Westfield (Mass.), read a paper on the "Management of a Small Gas and Electric Light Plant." He supplied a town of 7000 inhabitants, and the output was about 7 million cubic feet per annum. There was no special feature about the gas-works, except a water jet exhauster, supplied from the town mains at 100 lbs. pressure. The price of gas was 10s. 6d. per 1000 cubic feet, less discounts. He bought out the Electric Light Company in 1887, and had since followed the plan of having regular prices for electricity, just as he had for gas. The electric light plant had now been entirely reconstructed, and comprised two 54-inch return tubular boilers of 70-horse power each, to run at 125 lbs. pressure, one 70-horse power condensing engine, supplying two 30-light 9 ampère Schuyler arc machines, and one 100-horse power engine of similar make, supplying a 45-light 7 ampère Schuyler, and a 500-light Thomson-Houston alternating incandescent dynamo. The prices charged for street lighting were 11d. per night for a 9 ampère lamp, running from 20 minutes after sundown to 1 a.m.; £20 per annum for commercial arc lights, less a 5 per cent. discount if the lamp was not used after 6 o'clock; and for incandescent lights there was a schedule varying according to the number of hours that the lights were used, but ranging from 0·5d. to 0·8d. per hour. The lower price was allowed for the longest number of hours, on the same principle as allowing discounts for day gas consumption. The commercial machines were run from dusk till 11 o'clock, or to 12.30 on Saturday night; and there was not enough demand to make it worth while to run them for a longer number of hours. The electricity had not damaged the gas department at all, although about 60 per cent. had been added to it in the last eighteen months. The arc lamps were preferred for street lighting, and this was done to the general satisfaction by 49 arc lamps and 6 25-candle incandescent lamps. There were 15 gas-lamps to light the streets during the small hours of the morning, after the electric lamps had been stopped. Incandescent lamps were generally used for interiors, and all the wiring was done free of charge by the Company. The lamps are supplied at cost price. It was very desirable that the whole of the wire conductors should be under the supervision of the suppliers. Comparing the cost of producing electricity and gas, steam and labour were cheaper than gas coal and retort-house wages; but most of the other expenses—especially those of distribution—were greater in the case of electricity. The latter cost on the average nearly £3 per lamp in the first place, and at least 8s. 4d. per lamp per annum was required to meet the charges for depreciation, repairs, and interest on this head alone. For this reason he had not attempted to do private house lighting by electricity, as he did not see how it could pay; and in the case of lights that would not be in regular use he thought gas was preferable. He therefore refused to put in any lamps that would not pay at least 2s. 1d. each per month. The outlay for electric distributing plant was thus utilized to the fullest extent; and at the same time a certain class of consumer was relegated to the use of gas. The price of gas was so high that shops kept open late were previously lighted by petroleum, but they were now lit by electricity. The electric light plant was necessarily large enough to meet the maximum demand, which obtained early in the evening; so that the lights used at other times could be supplied at a cheaper rate, as already observed, and could thus compete with petroleum. He preferred the contract system to the meter system, as enabling him to stipulate for the number of hours that the lights should be used; and in a small town it was easy to see that the consumers kept to their contracts. An electric lamp that did not yield at least 25s. per annum was a certain loss; and his business was conducted on the principle that electricity should be used for steady continuous lighting. The length of time during which the electric light was used determined the economy of its supply.

Discussion having been invited, Mr. Stiness said that he had followed the lines laid down in the paper almost identically. He supplied 70 million cubic feet of gas annually, and had an electric light plant equal to about 500 arc lights. He spoke highly of the push, energy, and scientific attainments of the electric light people; and said that competition with it would certainly have to be encountered by all. It was not antagonistic to gas, and the two might be worked together; and he could say after his experience, that the electric light was a good paying business when properly managed. Mr. Coggshall said he had commenced the supply of electricity a month before, and was doing a satisfactory business. Mr. Holmes was supplying 40 arc street lamps, 60 large, and about 500 ordinary incandescent lamps, and was doing well. He enjoyed the advantage of ample water power. He charged 3s. 2d. per month for 16-candle lamps, with a discount of 5 per cent.; and £17 per annum for the arc lights. Mr. Harbison remarked that the writer of the paper had stated that when supplied for long periods of consumption, the electric light was cheaper than gas; but it was necessary to remember that this referred to gas at 10s. 6d. per 1000 cubic feet. Had the comparison been made upon the basis of gas at 6s. or 7s., the conclusion might have been different.

(To be continued.)

The London County Council and the Testing of Gas.—At the last meeting of the London County Council, the Sanitary and Special Purposes Committee reported that, on July 23 last, they informed the Council that they had addressed a letter to the Board of Trade, urging upon the Government the desirability of introducing into Parliament a Bill having for its object (1) the provision of a trustworthy standard of light in lieu of the present unsatisfactory candle standard; (2) the prescription of a standard photometer with which official photometers could be compared; and (3) giving legal force to testings made with portable photometers. They now recommended that a letter should be addressed to the Board of Trade, urging that Board to promote during the present session of Parliament a Bill for providing a trustworthy standard of light and a standard photometer. The same Committee reported that during the present year the gas supplied to the district of Old Street, St. Luke's, had been of deficient illuminating power; and they recommended that the attention of the Gas Referees should be directed to the matter, and that they should be requested to prescribe an additional testing-place in such a position as to ensure that the gas supplied to the district will be subject to official examination. Both recommendations were agreed to.

SIMPLE FORMS OF APPARATUS FOR TESTING AND MEASURING GAS.

We give below a short description of three simple forms of apparatus for the testing and measurement of gas, which possibly may be found useful by some of our readers.

In the course of investigations undertaken by M. Egraz, the Chemist of the Lyons Gas Company, he experienced the need of a simple yet practical apparatus for the analysis of gases. After a number of trials, he was led to adopt the instrument devised by M. Péteaux, Professor of Chemistry and Physics in the Veterinary School at Lyons, which, for convenience of manipulation and precision of results, he found to be capable of rendering good service, even in the hands of operators unaccustomed to this kind of analysis. This apparatus, which is shown in fig. 1, consists essentially of a test-tube of any given volume—say, 150, 100, or 50 cubic centimetres, as may be most convenient — graduated in cubic centimetres, halves, or tenths, according to the exactness to which it is intended to carry the analysis. The tube is securely closed by a cork, or preferably by an india-rubber stopper.

FIG. 1.

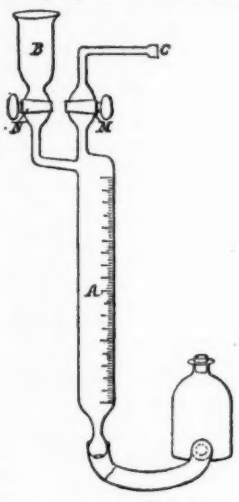


FIG. 2.

Through this stopper passes a tube, the lower extremity of which is open; and the upper end soldered to a small receptacle to contain the reagent. Immediately below this vessel, and just above the stopper, there is a lateral opening in the tube, as shown. The method of using the instrument is as follows:—The tube having been filled with a specified quantity of gas, measured with the usual precautions, it is placed over a trough of water or mercury, as the case may be. Then the reagent—caustic potash, pyrogallic acid, bromine, cupreous chloride, &c.—is placed in the receptacle, which is filled to the edge with water, closed with the thumb, and inserted rapidly into the test-tube. The stopper is pressed into the mouth of the tube, and the free end of the small pipe closed with the finger. The apparatus is then drawn from the trough and agitated, when absorption takes place. It is afterwards replaced in the trough, and the finger removed, when the liquid precipitates in the test-tube by the lateral orifice. It is again agitated (the reagent being renewed if necessary), until complete absorption has been effected. With each fresh reading, the stopper has necessarily to be removed. One advantage claimed for the instrument is that it does not require a tap, which is one of the inconveniences usually attending appliances used for this kind of analysis. Another and a very important one is that it may be made by anybody; all that is needed being a graduated tube. The soldering of the small pipe to the receptacle for the reagent will be quite a simple operation for anyone who is in the habit of working glass. The apparatus has been employed for ascertaining, by means of bromine, the quantity of ethylenic hydrocarbons in illuminating gas; and it has been found to give results substantially the same as those obtained with the Bunte burette.

The apparatus shown in fig. 2, which has been devised by M. Villot, was recently illustrated in *Industries*. By altering the height of the bell-shaped vessel, which is filled with water or mercury, and simultaneously opening the stopcock M, gas can be made to enter or leave the graduated measuring-tube A through the pipe C; while by opening the stopcock N, any absorbing reagent may be allowed to drop into the gas from the vessel B. As will be seen, the apparatus is simple in construction; and it will be found useful for rapidly determining the quantity of carbonic acid and carbon monoxide present in mixtures of gases.

An extremely useful piece of apparatus has been devised by Professor Lunge, and recently described in the *Berichte*, by the use of which all the troublesome reductions to standard temperature and pressure in the measurement of gas volumes may be avoided; the volume being actually read off corrected to 0° C. and 760 mm. pressure. The arrangement (says *Nature*) is at once simple and capable of adaptation to any form of gas apparatus. It consists essentially of three glass tubes—call them A, B, and C—arranged parallel to each other vertically, and all connected below by means of a glass T-tube and stout caoutchouc tubing. A is the measuring vessel, graduated in cubic centimetres (any gas measuring vessel, such as that of a nitrometer, or of a Hempel or other gas analysis apparatus, may be used for this purpose). It is closed at the top by the usual well-fitting stop-cock, through which the gas to be measured is introduced in the ordinary manner. Below, the gas is enclosed by mercury, which is poured down the tube C; which Professor Lunge terms the pressure-tube. This is simply an ordinary straight glass tube of similar diameter and length to the tube A, and open at the top. The tube B, called the reduction tube, is of about the same length, but of somewhat greater diameter in its upper half. This cylindrical expansion narrows again at the top, and terminates with a well-greased stopcock. The tube A is firmly clamped to the stand, while B and C are held in spring clamps which permit of ready lowering or raising. The tube B is then prepared as a reference tube, once for all, in the following manner:—The stopcocks of A and B are opened, and mercury is poured down C until it rises nearly to the expanded portion of B. A drop of water is then introduced into B, so that the enclosed air is saturated with aqueous vapour. The thermometer and barometer are next observed; and the apparent volume is calculated of 100 c.c. of gas at 0° C. and 760 mm. A mark is then made upon the tube B, so that the volume of the tube between this mark and the stopcock is the calculated apparent volume of the standard 100 c.c. The size of the tube is so arranged that this mark falls on the narrower portion of the tube, just below the expanded part. The pressure tube is then raised or lowered until the mercury in B stands at the mark, when the stopcock at the top of B is closed. Thus a volume of air is enclosed which at 0° and 760 mm., and in the dry state, would occupy exactly 100 c.c. In order to determine the corrected volume of a gas, it is then only necessary to introduce it into the tube A, allow it to cool to the temperature of the room, and then adjust B until the mark is a little higher than the mercury meniscus in A. C is next raised until the mercury in B rises to the mark, when B and C are finally simultaneously lowered until the level of the mercury in A and B is the same. The gas in A and the air in B are evidently equally compressed; and thus the volume read off upon the tube A represents the corrected volume at 0° and 760 mm. The simplicity of the arrangement and the rapidity with which it can be worked are, it is thought, sure to recommend it for general use.

The Proposed Testimonial to Mr. G. Livesey.—A meeting is to be held at the Cannon Street Hotel to-morrow afternoon, to consider the best means of appropriating the fund raised to mark the public appreciation of the conduct of Mr. George Livesey during the recent gas strike in South London.

The Disposal of London Sewage.—It is reported that the Native Guano Company have made an offer to the London County Gouncil to treat the whole of the sewage of the Metropolis by the "A.B.C." process, and entirely dispose of the sludge, for the sum of £250,000 per annum, on the same lines as the Company are now dealing with the sewage of Kingston-on-Thames and Surbiton.

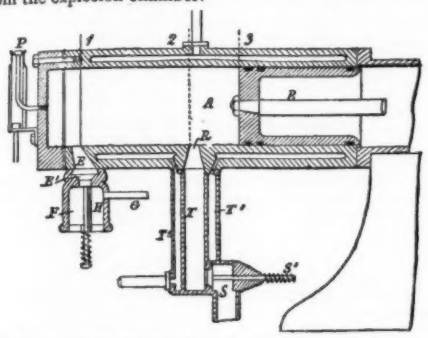
A Central Electric Lighting Station in Copenhagen.—The Corporation of Copenhagen have decided to erect a central station for electric lighting for the interior portion of the old town; and the plans have been settled by a Committee. In accordance therewith a station will be constructed with a capacity of 10,000 incandescent lamps; but the arrangements will allow of later extensions. The capital required has been calculated at about £66,000; and it is recommended to allow the Corporation, at the consumer's expense, to lay in the connection from the street cable to the meter. The consumer is to pay a rent for the meter, which about corresponds with the actual outlay for first cost and repairs; and the charge for electricity consumed has been fixed at 8 öre (7½ öre = 1d.) per 100 watts. Theatres and other large consumers will be allowed some reduction on this charge.

Gas-Resisting Plants. — Although (says *Amateur Gardening*) lovers of plants and flowers are only too conscious that a large number of favourites do not thrive for any length of time in gas-lighted apartments, there are a few good plants which can be safely recommended for the embellishment of rooms, even though they are lighted and heated by gas. The best of them, perhaps, is the variegated parlour palm (*Aspidistra lurida variegata*). There is also a green-leaved variety of the same subject suitable for a like purpose. Then the cabbage palm (*Corypha Australis*), date palm (*Phœnix dactylifera*), bungalow palm (*Seaforthia elegans*), fan palm (*Chamærops excelsa*), and the dwarf fan palm (*Chamærops humilis*) are all well adapted for growing in rooms. The same may be said of the india-rubber plant (*Ficus elasticus*), providing the temperature does not fall below 40° in winter, Australian silky oak (*Grevillea robusta*), and the hardy drag on trees (*Dracœna indivisa* and *Dracœna congesta*). Provided watering is judiciously performed, our contemporary says no one need hesitate to attempt the culture of any of the above in their rooms.

REGISTER OF PATENTS.

Gas-Engines.—Roots, J., of Westbourne Park, London. No. 3972; March 6, 1889. [6d.]

This invention relates to a gas-engine in which there is a working stroke each revolution, and in which the exhaust-valve is not opened by mechanism from the crank-shaft, but is an ordinary lift-valve. All the four processes of suction, compression, explosion, and exhaust occur in one revolution, and on one side of the piston in the cylinder—that is, that the one side is not used as a pump to force the charge to the other side on which the explosion takes place, or to pump the products from the explosion chamber.



A small charge of gas having been drawn in to start the engine and compressed into the hot tube P, the explosion occurs; the piston B making its working outstroke until the exhaust port R in the cylinder A is uncovered, when the products pass through the port R. The exhaust-valve S is opened by the pressure of the exhaust, and the excess products then flow out. The valve is afterwards closed by the spring S_1; and the piston B continues its outstroke, during which time the products in the length of tubing forming the chamber T are cooling, and in contracting cause more products to flow from the cylinder into T, and thus assist the lowering of the pressure in the cylinder below the atmospheric pressure caused by the continued outstroke of the piston. The fresh charge of gas and air then enters, by the sloping admission-port E and admission-valve E_1, from the bell chamber F open to the air and to the gas-pipe G. This by the heat of the cylinder A, and the coming in contact with the cylinder cover and walls by the slope of the port, expands and displaces more of the exhaust through the port R. The piston now commences its instroke, forcing the exhaust products through the port R until the piston covers the port, when compression commences, and at the end of the instroke (at the highest compression) ignition occurs. The cycle then commences again. Thus briefly the operation is explosion, part of exhaust, and suction in the outstroke; the remainder of the exhaust, and compression in the instroke.

There is only a short length of tubing shown for the chamber T. But it may be of any size according to the length of the suction stroke; and the chamber is preferably made with a jacket through which cold water passes on its way to the cylinder jacket. The condensing chamber T much increases the efficiency by permitting the suction portion of the stroke to be shorter, and therefore the working portion of the stroke longer; and the chamber can be made of such size and cooling surface as to do nearly the whole suction work of the engine.

The dotted lines 1, 2, and 3 show about the respective lengths of the stroke; 1 to 2 being about the length of the working portion of the stroke, and 2 to 3 of the suction portion of the stroke. As shown, it is about nine to four; but it will vary according to the size and construction of the chamber T. When compression commences, the cylinder contents are in about the same proportion—new charge, nine; products, four.

Electric Ignition Apparatus for Gas-Engines.—Sumner, H., of Nottingham. No. 7522; May 6, 1889. [4d.]

This invention relates to the application of an electric spark, produced by statical electricity (especially from the influence, or "Wimshurst" influence electric machine), for igniting the charge in gas motor engines. The electric machine is fixed on any suitable part of the engine it has to serve; and conducting wires are led from it to a cell or chamber in communication with the motor cylinder, so that a continuous stream of sparks are given from one to the other of the terminals of the conductors, inside the cell or chamber. Communication from the chamber to the inside of the cylinder is opened and closed at the proper moment for the ignition of the charge, by a valve worked by any suitable mechanism on the motor itself.

Ignition Apparatus for Gas-Engines.—Sumner, H., of Nottingham. No. 7533; May 6, 1889. [6d.]

The present invention relates to the application of a travelling incandescent, coiled, or porous piece of platinum, or other suitable metal, with or without flame, for the purpose of igniting the charge in gas-engines. It is proposed to arrange the platinum in a hollow cylindrical rod on a central holder, opposite small circular openings on each side of the hollow rod, so that a jet of gas, or Bunsen mixture, can be directed through the openings on to the coil or porous platinum, for the purpose of keeping it incandescent. The hollow rod is made to pass through a cell or chamber in communication with the motor cylinder, by suitable stuffing-boxes packed with asbestos; and at the proper moment for the ignition of the charge in the motor cylinder, is actuated by a cam, eccentric, or other suitable motion, worked by the motor. It is also provided with a hood or shield, which surrounds the small openings through the rod when the latter is at rest, and having corresponding openings on each side, and through which the gas or mixture is blown by a nozzle; this shield being intended to prevent draughts of air from cooling the platinum, or diverting the gas-jet.

Metallic Joints for Flanged Pipes, Metal Covers, and the Like.—Baird, R., of Glasgow. No. 17,161; May 30, 1889. [6d.]

According to this invention, there are formed at the edges of soft metal strips or rings, small projecting rims on both sides (preferably of V shape), in which the sharp edges of the V projections are facing outward; so that when being subjected to pressure between the parts to be jointed, they will be pressed into and fill any unevenness that would prevent the joints from being made tight. The strips or rings may be inside the bolt holes entirely, or holes may be made in the thin web between the rims, so that one rim would be inside and the other outside the bolts.

Atmospheric Gas Burners.—Cox, H., of Pall Mall, London. No. 19,851; Dec. 10, 1889. [6d.]

This invention has for its object to provide, in connection with atmospheric gas burners, means for ensuring the proper blending and expansion of the mixture of gas and air before it reaches the burner.

A and B are the outer and inner casings, perforated as shown; G, the gas-supply pipe; D, the gas plug or tap; and H, the gas-inlet pipe leading the gas into the chamber C to mix with the air. E are arms connecting the gas-tap with the casing B. Between the air and gas inlets and burner, there is arranged first a contraction, and then an enlargement or chamber of greater capacity, in which the mixture of gas and air expands before it passes to the burner; and as the mixture becomes quiescent in this chamber, it passes steadily to the burner. The enlargement is shown in the drawing as being constituted by a tube L of larger diameter, secured at one end to the contracted passage or tube K leading from the chamber C, which passage K acts as an amalgamater for the gas and air before the mixture passes into the enlargement L, in which after it has expanded it passes to the burner M in a manner well suited to secure its proper consumption.

Gas-Burners.—Dugdale, E., of Brierfield, near Burnley. No. 20,008; Dec. 12, 1889. [6d.]

This invention relates to the employment of a slantingly-held disc over the exit holes of the burner for the gas to impinge upon; owing to the heating of the disc, so that "more perfect combustion" is effected, "thereby giving increased illumination." The disc can be made of any suitable metal, and is attached to a band arranged to encircle the top of the burner tip.

Joint for the Suspension of Gas-Lighting Apparatus.—Crenier, A., of Paris. No. 370; Jan. 9, 1890. [6d.]

This invention has for its object an articulated joint for the suspension of gas-lighting apparatus in all cases where it is desired that there should be a certain amount of mobility. It is constructed principally of two pieces (one placed in prolongation of the other), one of which is forked and secured to the other by means of a plug.

Regulators for Gas-Engines.—Rossney, W. C., of Norfolk, and Cutter, W. G., of Cambridge, Mass., U.S.A. No. 1493; Jan. 28, 1890. [8d.]

The patentees remark that, in engines in which the piston is driven by the explosion of ordinary illuminating or water gas, the force thereof causes a back pressure of gas in the main pipes, which frequently extinguishes the lights in outer places supplied from the same pipes; and to overcome this it has become customary to employ rubber bags or receivers, into which the gas is forced by the concussion, and which serve in part to equalize this pressure. The action of the gas upon the material of these bags, however, rapidly causes them to become brittle or decomposed, and necessitates their frequent renewal; moreover the direct pressure of the gas in the main pipes varies to a great extent, and renders the action of the engine uneven. The present invention is designed to overcome these and other objections. A [see illustration on next page] is the body of the regulator, B the supply, C the discharge pipe. The body is cylindrical; and a vertical cylinder D is secured to the bottom G within the body—the cylinder being open at its top F. A vertically arranged socket or guide tube H is secured centrally to the bottom, within the cylinder. A spindle H, provided on its upper end with a knob or weight I, is fitted to slide vertically

Fig. 1.

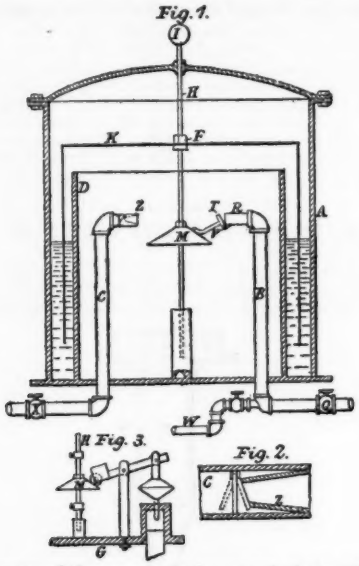


Fig. 3.

Fig. 2.

through the centre of the cover; the lower end of the spindle working in a guide. An inverted dome or bell K is secured centrally to the spindle by nuts, and encloses the cylinder D; the mouth of the dome being immersed in a seal of glycerine, mercury, or similar material disposed between the cylinder and body walls. A vertically adjustable cone-shaped disc M is secured to the spindle H within the cylinder. The supply-pipe is provided with an ordinary valve Q, and enters the body vertically through the bottom and within the cylinder. The upper end R of the supply is turned horizontally toward the spindle, and a gravity valve T is hinged to the lower edge of the mouth. The valve T is provided with a curved arm V, which normally rests on the desk M. A small pipe W taps the pipe B, below the regulator, and supplies the pilot light of the engine. The discharge C has an ordinary valve X, outside the regulator, and enters vertically through the bottom within the cylinder. The upper end Y of the discharge is turned horizontally towards the spindle; and within the mouth of this horizontal portion, a cone-shaped piece of piping Z is inserted in the inner end of pipe, being inclined so as to form a valve seat. A swinging valve is hinged by its upper edge within the pipe Y, in such a position as to engage the seat.

The gravity valve T is normally open; and the gas, entering through the pipe B, causes the dome K to rise and carry with it the spindle H, to which it is secured. The disc M engaging the valve arm V elevates the arm as the dome rises, and closes or partially closes the valve T, so as to reduce the supply of gas. At the forward stroke of the engine-piston (which creates a vacuum in the piston cylinder), the gas rushes into the discharge C, causing the swinging valve to assume the position shown by the dotted lines in fig. 2. As the gas thus supplied to the engine is exploded by the pilot light in the ordinary manner, and is forced back through the pipe C by the recoil, the valve is swung back against its seat (see dotted line in fig. 2), closing the pipe, and preventing the escape of gas back into the regulator. Thus the recoil from the engine can have no effect upon lights supplied from the main pipes.

The variations of pressure in the main pipe being determined, the position of the dome on the spindle H is so fixed as to regulate the supply of gas to the engine at any desired pressure by means of the disc M and valve T. In fig. 3 a lever is pivoted to the top of a standard secured to the bottom of the regulator between the tube H and the supply B. A cone valve is pivoted to one end of the lever, and a seat therefor is formed in a tube, into which the supply B opens. A counterbalance is disposed on the opposite end of the lever; and a wheel is journalled therein, resting on the disc M. The spindle H, rising as described, forces the cone valve downward into its seat and thus checks the flow of gas into the regulator.

Alfreton Local Board Water Supply.—The tender of Mr. E. Tempest, of Leicester, amounting to £6485, has been accepted by the Alfreton Local Board for enlarging their water reservoir at Butterley, Ashover.

The West Riding County Council and Water Supply Questions.—The West Riding County Council, at their meeting at Wakefield last Wednesday decided that it was "expedient" to oppose, in the present session of Parliament, the Bradford and Morley Water Bills. With reference to the former, Mr. Alderman Darwin informed the members that the Committee who had the matter in hand had obtained from the promoters of the Bill the protection they required for their main roads, and had also induced them to agree to supply water to the districts through which the conduit conveying the new supply from the River Nidd passed. At a subsequent stage of the proceedings, Alderman Gaskell, M.P., said that at the previous meeting of the Council, the Chairman (the Marquis of Ripon) had spoken of the difficulties in the way of obtaining a Parliamentary Standing Order relative to the inclusion in Water Bills of clauses referring to the discharge of compensation water. He had since inquired into the matter; and, as a result, it had been agreed to submit the following resolution:—"That the Riding Solicitors do communicate with the authorities of both Houses of Parliament, and suggest that a Standing Order be made, by which instructions should be given to Parliamentary Committees dealing with Water Bills, to pay special attention to the securing as far as possible, and where requisite, of a continuous flow of compensation water." Mr. H. W. Stansfeld seconded the resolution, which was approved of.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Avery Gas Process.

SIR,—Referring to the report of the Directors of the Avery Gas Company to their shareholders, published in your JOURNAL (p. 593), and which appears to have also found its way into the hands of some of the proprietors of The Gaslight and Coke Company who are not Avery shareholders, I am instructed by the Court of Directors of the latter Company to send you, and request your publication of, the last communication on the process made to me by Mr. Trewby, our Engineer-in-Chief.

J. O. PHILLIPS, Secretary and General Manager.

The Gaslight and Coke Company, Horseferry Road, Westminster, S.W., April 9, 1890.

[ENCLOSURE.]

The Gaslight and Coke Company, Horseferry Road, Westminster, S.W., April 9, 1890.

J. O. Phillips, Esq.,

Dear Sir,—With reference to the interim report, signed by Mr. Jenkins, on the economy of the Avery gas system, dated the 27th of March, to which you have drawn my attention, I beg to say that the experiments made with the apparatus at our Beckton station have not warranted me in bringing the matter before our Board for further extension of the system. The apparatus which we have, and which was put up by the Avery Gas Company at their own expense, is comparatively small. You may judge what my opinion of it is from a perusal of the last letter which I addressed to them on the subject.

(Signed) G. C. TREWBY.

The Gaslight and Coke Company, Horseferry Road, Westminster, S.W., March 26, 1890.

C. Jenkins, Esq., Avery Gas Company,

Dear Sir,—In reply to your letter of the 24th March, I beg to say that my experience of the working of the Avery apparatus at Beckton up to the present time is that the wear and tear upon the iron pipes is so great that it would render the use of the apparatus for our purpose on a large scale prohibitory. In my former letter I drew your attention to the fact that several of the pipes had split, and that consequently we had to re-arrange the whole apparatus. Since then it has only been at work, on and off, testing various kinds of oil; and from what I have seen of the working of it, I should not feel justified in recommending its extension on a manufacturing scale.

(Signed) G. C. TREWBY, Engineer-in-Chief.

Oxygenated Oil Gas and the Avery Process.

SIR,—The articles on the above subjects in your issue of the 1st inst., and the numerous notices you have lately given of similar matters, should prove of great interest to your readers, as tending to show that the use of oil in British gas-works is not the visionary dream of a few enthusiasts, but is becoming a practical fact that cannot be ignored. The recent labour difficulties and the threatened coal famine, although bearing strongly on this point, need not be particularly alluded to, as many of your readers must have had a foretaste of the troubles in which they may at any time be involved by a repetition of the late situation. The fact remains that coal—the only material at present in general use for making gas—has greatly advanced in price, and is likely to increase still further in the future; while any stoppage of the supply from any cause, and however temporary, would paralyze every gas-works in the kingdom. If, then, it can be demonstrated that the general, or even the partial use of oil for gas would prove an economy, reduce to a minimum the risk alluded to, prove a superior material for producing gas, and release even half the present enormous quantity of coal used for this purpose, it will not require a prophet to show that it must be adopted with advantage to the public as well as those directly concerned in the manufacture.

With our present knowledge of the material, of its inexhaustible sources of supply, its present and probable price, facility of delivery and storeage, and the processes by which it can be made available for gas, not to name future improvements certain to be forthcoming when once in use, it behoves every gas engineer and manager to study the question thoroughly, and not dismiss it without a second thought. There can be no difficulty in showing that crude or refuse petroleum can even now be used economically to at least partially displace coal as an enricher of ordinary gas, or, in conjunction with water gas, easily increase the supply. It is not necessary to exaggerate the power or value of oil for these purposes; and as the manufacture of oil gas is not a thing of yesterday, and there is nothing new or secret in its production—one process or apparatus varying but slightly in practical effect from any other—it may be considered surprising that it has not been tried earlier on a commercial scale.

It may be advisable to enumerate briefly some facts that apply to the present position, as hitherto the price of oils has barred their use to any extent. Though the crude or the refuse oils may be variously quoted at from 50s. to 60s. per ton delivered in England, they have been purchased as low as 40s.; and this figure may be taken as a reasonable price likely to be insured were there any constant demand. The oil will give an average yield of 100 cubic feet of 60-candle gas per gallon—being 25,000 cubic feet per ton. Though at a higher heat in the retorts the production may be pushed to 125 cubic feet or more per gallon, the illuminating power suffers in greater proportion than the quantity will compensate for. (One of your notices gives 100-candle gas nominal; but this appears to be only obtainable by estimation in using a regenerative burner.) Pure oil gas, even of the richest quality, when burnt at sufficient pressure in a proper-sized burner (No. 00, for instance), does not smoke, and has not so yellow a light as coal gas, though it is more affected by a dirty and unsuitable burner. It may be diluted with water gas—in any proportion, down to 15-candle gas if need be, without any loss of its total illuminating power, but an actual gain in effect between the 15 and 30 candle standard, which may be attributed to the superior heating value of the admixed hydrogen aiding the incandescence of the excess carbon in the oil gas. Dilution with air is fatal to illuminating power in the same way as it is with coal gas; while if

reduced to a low standard, the mixture cannot be kept alight, although far from the explosive point. It, in fact, appears to stratify. Oil gas mixes with coal gas in any proportion intimately, and does not stratify; raising the illuminating power in true ratio to the quantity added. The mixtures with oxygen you have recently commented upon; and though the results named are hardly those which might be expected, such mixture does not seem to commend itself for general use. On the other hand, enriched water gas is more suitable than coal gas for all and every use to which gas is now applied—light, heat, and power.

The whole matter hinges on one of cost—Can it be produced more economically? It has been shown by others and elsewhere that water gas can be produced in quantity at less than 6d. per 1000 cubic feet; and if this gas is used as the carrier of oil gas, its value must of course be added to the cost of the proportion of oil gas used, or of the oil used, as there would be practically no fuel account to charge against the oil gas in working a combined and continuous process. Taking the cost of oil at 2d. per gallon, or £2 1s. 8d. per ton, producing 25,000 cubic feet of the richest gas to be diluted with 75,000 cubic feet of water gas, costing £1 17s. 6d., thus making £3 19s. 2d. as the cost of 100,000 cubic feet of the mixed gases, of not 15-candle standard, but probably, for the reasons before stated, of from 16 to 17 candle gas, this gives 9¼d. as the cost of 1000 cubic feet—a result different from that claimed for the Avery process, in which the cost of the diluent is not taken into account, but sufficiently good to merit the serious consideration of all interested, as it shows a large saving on the cost of gas, as generally made, and will still admit of a very good margin for unforeseen expenses.

After what is stated with regard to the displacement of ordinary coal by oil, it is unnecessary to show that which is self-evident, and that it applies with more force to cannel coal as an enricher, with the advantage that no special arrangements need be made for a working trial, as any ordinary retort can be adopted, with but little change for the use of the oil, to serve nearly if not quite as well as a special arrangement.

L. A. Scott, Mem. Soc. Eng.

Woodbridge, April 8, 1890.

Age of Candles a Factor in Photometry.

Sir,—I see in your issue of the 8th inst. a letter from Mr. T. S. Cleminshaw, of Launceston (Tasmania), giving his experience with some old candles. While in Bombay I had occasion to use some which were about eight years old; but they had always been kept in hermetically sealed tins. As I had no new candles by me, I was unable to test them except against a Methven screen, when the old candles showed the gas as of 19-candle power, while the Methven screen only made it some 14 candles. I attributed the great difference more to the heat of the climate in which they had been than to their age. The photometer used was also an Evans closed-in pattern.

In the "Register of Patents" in the same number you mention an invention of a Mr. Gardner, for "Improvements in globes for gas-lights." This seems to me to be exactly similar to one which was patented by a Mr. S. Spencer some years back, and which I had the opportunity of testing when I was with the South Metropolitan Gas Company.

Henry O'Connor,
Late Assistant-Manager, Bombay Gas Company.

27, *Alexandra Road, N.W., April* 10, 1890.

The Probable Existence of Petroleum and Natural Gas in England.

Sir,—Referring to the editorial article on the above subject in the last number of the Journal, I am sure that you will pardon me for correcting a few of the remarks contained therein.

First, the discovery of coal in Kent had nothing whatever to do with any theory as to the existence of natural gas and oil. The *rationale* of my theory, and the data in its support, had been explained to Mr. Verdin some time before the discovery of coal in Kent. I first suggested publicly my opinion in my lectures on "Gaseous Fuel" in 1888; and I had been in correspondence with drillers in Pennsylvania between two and three years on the subject.

Secondly, the position of the natural gas and oil is not presumed to lie under the iron-ore deposits, but under the salt strata of the Cleveland and Cheshire district.

Thirdly, the predictions are not based essentially on actual geologic data, because at such a depth we have no geologic premises on which to formulate a theorem. The theory is to a considerable degree based on organic chemical data, and its submarine associations, combined with correlative incidents and corroborative characteristics present in a knowledge of the known salt-fields and natural gas and oil territories. The wisdom or unwisdom of my theory can only be demonstrated by the point of the drill; and I am quite sure that, upon patriotic grounds, everyone will join in the wish that the theory may prove to be true. It is almost impossible to measure the benefits to the nation that would accrue from the discovery of such portable and intrinsically valuable fuels as are both natural gas and petroleum.

B. H. Thwaite.

Liverpool, April 9, 1890.

Steel Melting by Water Gas.

Sir,—From the notices of the experiments made at the Leeds Forge in melting steel with water gas which have appeared in your own and the other technical journals, it may be inferred that the steel was made on the open hearth of a Siemens furnace (with four regenerators), and that the fuel employed was a mixture of producer and water gas. A charge was made, it appears, in five hours, with a consumption of fuel equivalent to 5 cwt. per ton of steel produced. These figures are very interesting to steel makers; but it would be well if they could be supplemented by information on the following points—viz., whether the water gas employed was mixed with gas from a Siemens producer, or with the gas sometimes called producer gas, which is made in the water-gas apparatus; also whether the consumption given as 5 cwt. represents the fuel consumed in the production of water gas, or of producer gas, or of both combined. No one will doubt that gas made in the Siemens producer may be enriched by the addition of water gas (hydrogen and carbonic oxide free from nitrogen), and that, by employing such enriched gas in the Siemens furnace, a higher temperature may be obtained than by using producer gas alone; but it may be questioned whether this can be done profitably, both as regards cost of fuel and wear and tear of furnaces.

With regard to the melting of a charge in five hours at the Leeds Forge, in the Siemens crucible steel-melting furnace, which was introduced about 1867, five to six charges have always been made per 24 hours in regular work; and if similar materials—viz., pig iron and puddled bar, or scrap—be used in an open-hearth furnace, steel should be melted as quickly in one case as in the other. This, indeed, has been reported from the Continent. If the puddled bar is charged red hot, the working should be even more rapid, as in pot furnaces cold materials are exclusively employed. The notices concerning the use of water gas at the Leeds Forge refer to the fusion of pig iron and scrap; and it follows, from what has been said, that there is no evidence of improvement by the use of water gas, as, of course, the melting of steel in crucibles and on the open hearth, to which reference has been made, is effected by means of gas from the Siemens ordinary producer.

The statement that the normal production of puddled iron in an ordinary puddling furnace is as low as 14 cwt. per shift, can only be looked upon as a clerical error, inasmuch as 32 cwt. per shift is the usual figure for a forge mixture, and the consumption of fuel 25 cwt. per ton of puddled bar, as may be found on reference to the standard works on iron and steel of Percy or Bauermann. A return which I have seen from the Pather Works, Glasgow, of the day and night shifts on the 24th of last month confirms these figures; the production of bar iron from an ordinary puddling furnace being given as 32 cwt. per shift, and the consumption of fuel 23 cwt. per ton of puddled bar. At the same works a Siemens double furnace of the new type has lately been set to work for puddling iron; and the production is returned as 3½ tons of puddled bar per shift, which is fully equal to the ordinary furnace, whilst the consumption of fuel is reduced to 6 cwt. per ton of puddled bar. It would be interesting to learn the consumption of fuel in puddling with water gas.

Gas.

April 8, 1890.

Water-Rates for Temporarily Closed Houses.

Sir,—In reply to the inquiry of the Secretary of a Water Company contained in your issue of the 1st inst. (p. 595), allow me to say that, section 71 of the Water-Works Clauses Act, 1847 (10 and 11 Vict., cap. 17), provides that a consumer shall pay the water-rate in respect of his dwelling "for the quarter ending on the quarterly day of payment next after his quitting the same or giving notice of his intention to discontinue the use of the water." To my mind, however, this is not a matter in which a company should insist on their full "pound of flesh." On the ground of expediency, the demand of the full legal claim is questionable. The Shylock spirit tends to produce much needless irritation, and embitters otherwise good customers; producing a feeling of resentment which is not forgotten when opportunity arises for its being put into effective action. The water is admittedly not supplied in the case quoted; hence a spice of mercy tempering the legal claim would be in conjunction with justice for an abatement being allowed.

D. T. Livesey.

Aldershot, April 7, 1890.

The Lighting of Courts at Coventry.—The Watch Committee of the Coventry Corporation held a meeting last Tuesday to consider the best means of securing the lighting of the courts in the city. It was found that there were 85 courts each containing ten houses and upwards; and it was agreed, after long deliberation, to recommend that where the landlords were willing to enter into an arrangement for providing lamps to be lit on the same style as the ordinary public lamps, the Corporation should contribute half the annual cost, which is now fixed at £2 11s. 6d.

The Supply of Gas in the Salford Out-Districts.—At Manchester last Tuesday week, a meeting was held of representatives of the out-districts supplied with gas by the Salford Corporation, with reference to the differential price. Mr. R. Spary, who presided, drew the attention of the meeting to a letter from the Corporation, dated May 4 last, in which it was stated that they would be prepared to favourably consider the application of the out-districts for the abolition of the differential rate in March, 1890. Now, however, the Corporation had written to them saying that, in view of recent circumstances connected with the gas supply of the borough, the Gas Committee had decided to postpone consideration of the matter until March, 1891. They were surprised that the Corporation should have taken this course, and considered that they had been treated in a very cavalier manner. They contended that any increase in the price of gas, which might have been brought about by recent circumstances, should be distributed over the whole area supplied. It was finally decided to adjourn the meeting to a date to be afterwards fixed upon, the representatives in the meanwhile to seek further instructions from their constituents.

The Falmouth Local Authorities and the Gas Company's Bill.—At a recent meeting of the Falmouth Local Board, the Chairman (Mr. T. Webber) reported that a communication had been received to the effect that the Chairman of Committees of the House of Lords took exception to one of the clauses in the Gas Company's Bill. It was the clause having reference to the purchase of the gas-works by the local authorities. The noble Lord stated that the Corporation of Falmouth ought not to be empowered to purchase the works, because they could not supply gas to the parish; and that the Falmouth Local Board ought not to be empowered to acquire the works, because they could not supply gas to the town. An informal conference had taken place between the two bodies; and a draft clause had been agreed upon to take the place of the one objected to. The Clerk (Mr. Jenkins) read the clause suggested in substitution, which was to the effect that neither authority should have the power to purchase without first obtaining a Private Act of Parliament. The amendment the authorities had agreed upon as to this clause was that, in the event of amalgamation, the governing body of the town could purchase the works without an Act of Parliament. This was approved of by the members.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS COMMITTEES.

Monday, March 17.

(*Before Lord* POLTIMORE, *Chairman; and Lords* WENLOCK, ERNE, DE TABLEY, and CALEDON.)

MORLEY CORPORATION WATER BILL.

This Bill came before their Lordships to-day. Its main objects are to enable the Morley Corporation to take lands and waters, to construct additional water-works, and to define rates for water supply; the various proposals involving an estimated outlay of £100,000.

Mr. PEMBER, Q.C., Mr. BALFOUR BROWNE, Q.C., and Mr. WORSLEY TAYLOR represented the promoters; Mr. SAUNDERS, Q.C., and Mr. WAUGH appeared in opposition for the Sowerby Bridge Local Board, and Mr. FREEMAN for the Halifax Corporation.

Mr. PEMBER, in opening the case for the promoters, said there were originally thirteen petitions; but, thanks to the exercise of reciprocal good sense on both sides, objections had been whittled down, and there now remained only one matter of detail, respecting which he hoped all difficulty would be removed before he had finished the remarks which he proposed to make on the scheme. Morley was a populous and increasing manufacturing town; and, being surrounded by other townships, it was obliged to go a considerable distance for its water supply. It stood in great need of an additional supply both for trade and domestic uses. Hitherto Morley had been dependent on Leeds for water; but the contract was terminable. The present scheme was adequate and not excessive, and had been favourably reported on by Sir Robert Rawlinson. The financial position of Morley, though it had been challenged in some of the petitions, was particularly good. All the petitions, with the exception of Sowerby, had now been settled. Sowerby complained that it would be injured by the Bill. The Local Board in their petition stated that in the near future it might be necessary for them to take the water supply of their district into their own hands. This might be perfectly true; and, if so, let them find the supply. But there was no allegation that they had asked for water of Halifax, within whose limits they were, and that they had not been able to get it. The Local Board complained of past legislation; but if it was improper to put them in the Halifax district, they should have told Parliament so.

Evidence was then given on behalf of the promoters.

Mr. *R. B. Hopkins*, the Town Clerk of Morley, said that in their district there was an increasing population, and consequently a growing domestic consumption of water, which necessitated an additional supply. It was not advisable that Morley should have to rely upon Halifax. The sources of supply had been gradually appropriated; and the scheme now proposed was the only one by which they could remedy the deficiency.

Cross-examined, witness said that Morley had endeavoured to obtain water from other sources, and formerly negotiated with Batley. But as to other towns, the Morley Corporation knew the local conditions prevailing, and so did not ask for water from persons who could not supply it. The cloth manufacturers of Morley paid as much as £49,000 a year for work done out of the district. In the borough of Leeds water was supplied at 6d. per 1000 gallons; but at Morley the rate was 10d. The result was that Morley lost a large amount of working trade —some manufacturers had gone away altogether; and no doubt any manufacturer who intended starting works would have to consider these facts. The Corporation felt they could not come to Parliament unless they had a scheme which offered a prospect of permanency.

Tuesday, March 18.

Alderman *Thackray*, the Ex-Mayor of Morley, was first examined this morning. He deposed that there were formerly good running springs in the district; but one after another they had failed, and now substantially the local supply had disappeared. The principal causes were colliery workings and a railway tunnel. In addition to a high price for the water they obtained, there was an insufficiency of supply, both for trading and domestic purposes. The effect of this on the trade of Morley was very serious; and the inconvenience would increase failing an adequate scheme. The Water Committee had been for several years making attempts to obtain a supply, and had searched for available sources.

Mr. SAUNDERS here intimated to the Committee that, after the evidence which had been given, he could not deny that an additional water supply was necessary; and the question would, he thought, now be one of the quantity to be taken from Sowerby for trade uses, as compared with that required for sanitary and domestic purposes. He accepted the statements that Morley had looked vainly in other directions, and subject to the limitation regarding quantity and the rights of Sowerby, he would not dispute the proposal that Morley should be permitted to take some supply from the district which he represented. He would, therefore, propose a clause which would have the effect of safeguarding the Sowerby Local Board.

Mr. WORSLEY TAYLOR remarked that the Bill now became unopposed so far as the preamble was concerned; and he would not call any further evidence unless their Lordships required it.

The CHAIRMAN said the Committee were quite satisfied that no further proof was required on the preamble. But he would like to know how this affected Halifax?

Mr. SAUNDERS observed that he did not wonder Halifax looked after their pecuniary interests, but sanitary interests were more valuable; and they were not likely to get much profit out of Sowerby.

Mr. BALFOUR BROWNE remarked that Halifax had a perfect right to be heard, as this was practically a delegation of their rights.

Mr. FREEMAN said he must ask to be heard for Halifax if their interests were to be attacked by a side wind.

Mr. SAUNDERS here read the clause which he proposed should be inserted in the interests of Sowerby. It provided that the Corporation of Morley should supply the Sowerby Local Board, subject to the requirements of their own districts for domestic purposes, such water to be supplied at a rate not exceeding 5d. per 1000 gallons; the Local Board to construct the necessary works.

Mr. BALFOUR BROWNE said that would be practically a clause authorizing a supply to Sowerby at less than cost price.

Mr. SAUNDERS: It would be subject to Morley having all they required for domestic purposes.

Mr. *C. Gott*, C.E., deposed that he had prepared the proposed scheme, and had advised the Morley Corporation as to their water necessities. A permanent supply was essential; and for domestic and trade purposes 700,000 gallons a day must be given.

Mr. *James Mansergh*, C.E., also stated that the need for water was very pressing both for domestic and trade purposes. The prospective supply for which Mr. Gott had estimated—namely, fifteen years, left very little margin. He had not considered the Sowerby petition; because as it was within the Halifax district, he thought there would be an invasion of limits if Morley were asked to give a supply. Such invasion was contrary to the provisions of the Public Health Act.

Cross-examined, witness said he did not know that Parliament made distinctions in the provisions for domestic and trade supply, putting the former before the latter, though it might be that in some instances such a distinction was made.

Mr. *Fenwick* also testified as to the needs of Morley. The necessity was quite as great for trade as for domestic purposes. The application of Sowerby was unreasonable, as the district could be supplied from Halifax.

Mr. *Martin*, C.E., likewise considered it unreasonable that the Morley Corporation should be called upon to supply Sowerby after providing for the domestic wants of their own district; and leaving the trade supply to be met afterwards. In fact, Morley would have no water to spare under this scheme, as the estimated 35 gallons per head per day was needed.

Mr. *Cayley*, a land agent of Malton, gave evidence of a similar character; and this concluded the case for the promoters.

Mr. SAUNDERS then addressed the Committee. He submitted that Sowerby was under no such obligation to Halifax as would preclude their Lordships from giving them rights to a water supply through Morley, a town which, though 20 miles away, proposed to obtain water from the Sowerby district. The natural position of Sowerby on the watershed surely gave it a prior right. It was impossible that Sowerby should go to Halifax for water; and it was illusory to say that, because Sowerby was within the Halifax district, the latter should give them a supply. He asked that Sowerby should be excepted from the clause proposed to be put in the Bill by Halifax; and contended that Morley and Sowerby ought both to be given their domestic supply first of all, and then Morley should take what remained for trade supply.

Mr. *E. Booth*, Clerk to the Sowerby Local Board, was called, and described the present inadequate provision for water in the township. The Local Board was formed subsequent to the inclusion of Sowerby in the Halifax limits. The latter had never faced the difficulty of laying a main to Sowerby; and there could not, in his opinion, be a better provision for the supply of Sowerby than the conduit leading to the Morley service reservoir.

In cross-examination, witness stated that the Sowerby Local Board had done nothing to supply their district with water, of which there had been a scarcity for several years. He did not know that Halifax had millions of gallons of water running to waste, nor was he in a position to contradict such a statement. The expense of carrying out works to secure a supply from Halifax would be greater than a community like Sowerby could bear.

Other similar evidence having been given,

The CHAIRMAN said the Committee would not call upon Counsel to reply. They were unanimously of opinion that none of the clauses proposed by the Sowerby Local Board should be inserted.

The preamble of the Bill was accordingly declared proved; and the Committee subsequently settled the clauses.

Wednesday, March 19.

(*Before Earl* BATHURST, *Chairman; Earl* ROMNEY, *and Lords* SALTERSFORD, BANGOR, *and* WIMBORNE.)

YSTRAD GAS AND WATER BILL.

This Bill, which, among other things, is to enable the Ystrad Gas and Water Company to construct further water-works, and purchase additional lands for their gas and water undertakings, came before their Lordships to-day.

Mr. BALFOUR BROWNE, Q.C., Mr. HARRIS, and Mr. THOMAS appeared for the promoters; Mr. CRIPPS, Q.C., and Mr. CUNNINGHAM, for the Ystrad Local Board, the former also representing the London and South Wales Coal Company; and Mr. SUTTON, for the Cymmer Company and Lord Dunraven.

Mr. BALFOUR BROWNE, in his opening address, said the district the promoters now supplied was about 11 miles long, with a population of 50,000 (as against 14,694 in 1871), and with 5868 houses. The quantity of water required was 800,000 gallons per day. Dealing with the petitions, he said that all reference to the raising of the water-rates had been taken out of the Bill. The Company at present charged on the rack-rental; but if they were only permitted to charge on the net rental, they would have to raise their charges proportionately.

Mr. *G. Hill*, C.E., was the first witness called. He said the present water supply was not sufficient for the district, as in a dry season the yield was only 600,000 gallons per day; whereas the quantity needed was 800,000 gallons. The estimate of £86,000 for the construction of the works would be reduced by about £10,000, owing, among other things, to the abandonment of one of the reservoirs.

Mr. CRIPPS, replying to the Chairman, said that unless the promoters inserted in the Bill terms on which the Local Board could purchase the undertaking, it should not be allowed to proceed.

The CHAIRMAN observed that he understood the promoters would not object to the insertion of such a clause.

Mr. CRIPPS remarked that the question of importance was the amount of the purchase-money.

Mr. *Rees*, C.E., and other witnesses spoke to the insufficiency of the present water supply.

Mr. *Morgan*, a Director of the Company, averred that the store of water in the tanks and filter-beds was only sufficient for nine days' requirements. The dividends paid to the shareholders had averaged 10 per cent. for many years past; and the present value of the £10 shares was £18 or £19.

Mr. *Baynes*, the General Manager of the Company, gave evidence as to the necessity for increasing the plant of the Company in order to meet the growth in the consumption of gas.

In cross-examination, witness maintained that the population of the district of supply was 41,000, and not 52,000.

This closed the case for the Bill.

Mr. CRIPPS proceeded to address the Committee for the Local Board; his principal argument being that the water supply of the district ought not to be left in the hands of the Company, but should be under the control of the Local Authority.

The CHAIRMAN asked whether Mr. Cripps suggested that the Committee should throw out the Bill, in order that there might be room for the possibility of the introduction of another Bill next year by the Local Board?

Mr. CRIPPS replied in the affirmative.

The CHAIRMAN expressed the hope that some arrangement might be come to, at the same time saying that it seemed rather a rough way to attain the object in view, with all the risks attending the introduction of a new Bill.

Thursday, March 20.

At the commencement of the proceedings this morning,

Mr. CRIPPS referred to what took place the previous day, and said that the parties had not been able to arrange terms. The Local Board were not inclined to accept the suggestion that the matter should go to open arbitration as regarded the purchase of the Company's undertaking. The terms which the Board were willing to accept were: (1) the reduction of the water-rates from being charged on the rack-rents to being charged on the ratable value; (2) the powers of the Act not to give any claim for enhanced value or compensation in the event of the Board purchasing the Company's undertaking; (3) no new works to be undertaken except with the consent of the Board, and only the cost price to be paid by them in respect of such works. The Board also thought there should be no power given to the Company to supply outside the district. If these conditions were inserted in the Bill, then his clients would be willing that it should proceed.

There was some discussion between learned Counsel upon these terms, after which

The CHAIRMAN intimated that the Committee considered that reasonable terms should be arrived at. He suggested that an arrangement might still be come to; and for this purpose an adjournment of three hours was made.

After the adjournment, Mr. THOMAS said the following was the text of the agreement which had been arrived at:—"The Local Board to have the option of purchasing the undertaking, lands, property, powers, rights, and privileges of the Company existing at the time of the notice to be given within six months of the passing of this Act, upon giving one month's notice in writing, upon the following terms and conditions—viz., the price to be fixed by agreement, or, failing agreement, by arbitration, in the manner provided by the Public Health Act. In case of arbitration, the price is to be ascertained on the following basis—viz., the net amount of profits actually earned by the Company for the five years preceding the passing of this Act. The Local Board are not to plead insufficiency of supply; and, for the purpose of the arbitration, it is agreed that the promoters have fairly met the demands of the district. The arbitrator by his award is not to award an enhanced value to the undertaking by reason of the passing of this Act; but the actual cost of new works executed, with interest thereon at 5 per cent. per annum, is to be paid by the Local Board. The Local Board, in the event of their purchasing, are to pay to the Company their reasonable costs in obtaining this Act. In the event of failure to agree, that such costs be taxed. No new works, except the construction of two filter-beds and the works of and incidental to the laying of a new 15-inch cast-iron pipe from the Company's weir on the Rhondda to the filter-beds at Tynywain, are to be executed by the Company without the previous consent of the Local Board. The Company are to pay all their debts and liabilities, excluding the debentures up to the date of the purchase; the Local Board to take over the debentures of the Company. The purchase is to be deemed a compulsory purchase; but the arbitrator in making his award is not to award a sum on this head exceeding 10 per cent."

The CHAIRMAN expressed the opinion that this was a very wise compromise.

The preamble of the Bill was then passed.

Friday, March 21.

The clauses of the Bill were gone through to-day, and modified so as to embrace the conditions laid down by the agreement between the parties; and a clause was inserted to the effect that, instead of the present charge for water supply being on the rack-rental as heretofore, it should be on the rateable value, but that the price should be such as would make it equivalent to the rack-rental charge.

Issue of Further Stock by the Staffordshire Potteries Water Company.—Under the provisions of their Act of 1888, the Staffordshire Potteries Water Company, in order to raise additional capital, have issued £9400 of 3½ per cent. debenture stock, and £5000 of new ordinary stock, which stock was offered for sale by public auction last Wednesday, at Stoke-on-Trent. The 3½ per cent. debenture stock was first disposed of. Four lots of £100 each realized £110; one, £109; one, £108; one, £107; five, £106; one, £104; and the remainder, £105—the whole producing £9903. As to the new ordinary stock, the two first lots were disposed of at £146 each; but the remainder fetched from £148 to £150 10s. per lot—the whole realizing £7462.

MISCELLANEOUS NEWS.

METROPOLIS GAS SUPPLY.

The Chief Gas Examiner for the Metropolis (Dr. Williamson, F.R.S.) has presented his report on the quality of the gas supplied by The Gaslight and Coke, the Commercial, and the South Metropolitan Companies, during the quarter ending March 31, 1890. The following is an abstract:—

I. *With respect to Illuminating Power.*—The average illuminating power, in standard sperm candles, at each of the testing-stations, was as follows:—

The Gaslight and Coke Company—	
Jewry Street, E.C.	16·3
King Street, E.C.	16·5
Ladbroke Grove, W.	16·6
Devon's Road, E.	16·7
Carlyle Square, Chelsea, S.W.	16·2
Camden Street, N.W.	16·5
Graham Road, E.	16·7
Kingsland Road, E.	16·4
Grove Gardens, Regent's Park, N.W.	16·3
Hornsey Road, N.	16·7
Lambeth Road, S.E.	16·3
Millbank Street, S.W. (cannel gas)	20·9
Commercial Gas Company—	
Parnell Road, E.	16·3
Wellclose Square, E.	16·1
South Metropolitan Gas Company-	
Hill Street, S.E.	15·9
Foster Place, S.W.	16·5
Stoney Lane, S.E.	16·4
Lewisham Road, S.E.	16·4
Burrage Road, S.E.	15·9
Blackfriars Road, S.E.	15·8

It will be seen from these results that the average illuminating power at all the stations of The Gaslight and Coke Company has been higher than the parliamentary standard of 16 candles. At the Ladbroke Grove station, the minimum lighting power was above the requirements; and at the King Street, Devon's Road, Camden Street, Kingsland Road, Lambeth Road, and Hornsey Road stations, it was equal to them. There were several cases of deficiency in the illuminating power of the gas tested at the various official testing-places in the South Metropolitan Company's district. The returns also showed that there were some cases of insufficient pressure and excesses of sulphur in the gas supplied by the Company. The Company appealed to the Chief Gas Examiner against these returns, on the ground that the strike of the Company's men threw the operations of the works into confusion; and the Chief Gas Examiner certified that the deficient illuminating power, the deficient pressure, and the excess of sulphur reported to have occurred were occasioned by an unavoidable cause.

II. *As regards Purity.*—Sulphuretted hydrogen was not present in the gas. The average amount of sulphur in other forms at each testing-place was considerably less than that allowed—viz., 22 grains per 100 cubic feet. Ammonia was generally present in the gas more or less frequently throughout the quarter; but only in slight quantities. The limit allowed—viz., 4 grains per 100 cubic feet—was not reached on any occasion.

PRESENTATION TO MR. DAVID TERRACE.

Last Saturday afternoon, the employees of the Dawsholm Gas-Works of the Glasgow Corporation, with their wives and other friends, forming a company of about 500 persons, met in the Burgh Hall, Maryhill, to make a presentation to Mr. David Terrace, who, after being Manager of those works for about nine years, has recently been appointed to take the entire supervision of the Middlesbrough Corporation Gas-Works. The meeting took the form of a *soirée* and concert.

Mr. W. FOULIS, Engineer-in-Chief of the Glasgow Corporation Gas-Works, presided; and he was supported by Mr. Terrace, the guest of the occasion; Mr. Manwell, of the Dalmarnock Gas-Works; Mr. D. M'Kechnie; Mr. T. Brown; Mr. Scott, of the Walls Street Meter-Works; Mr. Legon, of the pay department; Mr. Duncan, of Dawsholm; Mr. Smith, of the Tradeston works, and others. After tea,

The CHAIRMAN opened the proceedings with a few remarks. He said he regarded the occasion as a very interesting one, and was much pleased at having been requested to preside over the meeting; the large attendance at which abundantly showed that the Dawsholm workmen entertained a high respect for Mr. Terrace, who had been their Manager for such a long period. The occasion was one calculated to excite pleasure, seeing that they were about to show in so tangible a way their regard for Mr. Terrace; but it was at the same time one for regret, more especially to himself, as he felt very keenly the departure of their guest to another sphere of usefulness. To him (Mr. Foulis) the removal of Mr. Terrace from Dawsholm would be a great loss, as he had proved himself to be a most valuable officer to the Corporation, and to him a most efficient colleague. The workmen of Dawsholm had done well, he thought, to manifest their friendly regard towards their Manager in such a way; and he felt that he might convey to Mr. Terrace their best wishes for his success and prosperity in his new situation. As for himself, he most cordially wished for Mr. Terrace the fullest meas ure of success to which he was entitled; and this was very considerable.

Later in the evening, the musical performance was interrupted for a brief space of time, to allow of the presentation being made.

Mr. M'KECHNIE, the resident foreman at the works for a long time, and formerly acting in a similar capacity at the Tradeston works, was the spokesman for the men. He said it must be very gratifying to their Manager, Mr. Terrace, to see so large a gathering of the workmen and

their wives when he was receiving the testimonial about to be presented to him. Mr. Terrace had been a long time with them, and had succeeded in conducting the business of the Dawsholm Gas-Works with credit to himself and satisfaction to his employers. He then presented to Mr. Terrace a very handsome gold watch and chain, the inscription on which was as follows:—"Presented to Mr. David Terrace, along with a tea service for Mrs. Terrace, by the *employés* of the Glasgow Corporation Gas-Works (Dawsholm Station), as a mark of esteem, on his leaving Maryhill to take charge of the Corporation Gas-Works, Middlesbrough. 12th April, 1890." He then handed to Mr. Terrace, for his wife, a massive silver tray and richly-engraved tea service, which also bore a suitable inscription. He said his fervent wish was that they might both be long spared to enjoy the gifts, and that there might be many happy days in store for Mr. Terrace in his new situation. The watch and chain would always show him that the workmen were mindful of the time when he was amongst them; while the tea service would show to his future friends in Middlesbrough that they expected them to partake with Mr. and Mrs. Terrace of the "cup which cheers but not inebriates."

Mr. Terrace then briefly replied. He assured all present that he felt at the time in a very trying position—being just about to break a tie that had bound him and them together for the past nine years. They had been pleased to mark the event by making himself and his wife the recipients of two handsome testimonials. On behalf of Mrs. Terrace, he thanked the donors very cordially; and they had his most heartfelt thanks for what they had put into his own hands. They might be quite certain that the gifts, which were of great value in themselves, would be handed down to those who, in the natural course of events, would come after them; and as their descendants might be imbued with the spirit of their parents, the presentation, prompted by the good feeling of the donors towards himself and his wife, would be treasured as heirlooms by their posterity. Proceeding, he said that the work which they and he had done during the past nine years was something to look back upon with satisfaction. The Glasgow Gas Trust—with Mr. Foulis as their Engineer—had required almost double the yearly make of gas at Dawsholm, in order to meet the wants of the city—that was to say, from 500 to 1000 million cubic feet; and this had been accomplished with very few additions to the plant. Such an increase in the rate of the gas manufacture had necessarily led to a corresponding increase in the number of hands employed; and this had improved the labour market in the district. He acknowledged the great assistance rendered him during his time at Dawsholm by Mr. M'Kechnie, the general foreman, and also from all the heads of departments. The men whom he addressed had also worked well; and thus, with the proverbial "long pull, strong pull, and pull all together," they had succeeded in gaining the approbation of their employers. He might tell them that a few days previously he had received an excerpt from the minutes of the Glasgow Gas Corporation making reference to his services, and expressing regret at his leaving his situation. He was very proud to have this. From masters and men, therefore, he was reaping the fruits of his labours; and he would long cherish the kindly recollections of the good feeling shown to him by both. After some reference to the happy days spent in the company of the workmen on the occasions of their annual trips, he went on to thank Mr. Foulis for presiding over the meeting, and for the kind words he had used when referring to him. The memory of the meeting and their kind presents would give him heart and courage when engaged in his new sphere of duty. In conclusion, he hoped that the Glasgow Gas Trust might go on in its present prosperous condition, and that they might all work under the new Manager, Mr. Wilson, as they had done under himself; and he sincerely trusted that the three Glasgow gas stations—Dalmarnoch, Dawsholm, and Tradeston—would succeed in the future as they had done in the past.

An enthusiastic vote of thanks to Mr. Foulis for presiding brought the interesting proceedings to a close.

Featherstone Water Supply.—The new water supply for the Featherstone Local Board's district will shortly be turned on; the source of supply being the Wakefield Corporation's reservoir at Snydale. Last Thursday Mr. T. Codrington, C.E., one of the Local Government Board Inspectors, held an inquiry as to the charges to be fixed for the supply of water to the dwellings in the district. The scale proposed was, on house property £6 rental, 10s. 10d. per year; varying to £25 rental, 19s. 6d. per year; and over £25, 4 per cent. on the ratable value. There was no opposition.

Electric Light at Weybridge.—A public meeting was held at Weybridge last Thursday, to determine the amount to be raised for street lighting purposes during the coming year. Dr. Sealy, one of the lighting inspectors, said they estimated that they would require £260 for the next year for lighting; and a 2¼d. rate would produce £264. He claimed that the inspectors, in providing the electric light for the modest rate of 2d. in the pound had achieved a good deal. The cost of putting the wires underground would be £200 per mile, exclusive of the lamp-posts, which would cost about 30s. each. They had something like six miles over which the lighting extended; and there were 18 lamp-posts per mile. The contractors had offered, if the parish constructed the necessary earthenware conduit, to put in the wires and remove the present poles and overhead wires without additional cost. It was purely a question for the ratepayers as to whether the underground system should be adopted. Mr. Yool pointed out that at a recent Vestry meeting, at which the inspectors were present, it was unanimously decided that, as soon as the experiment had been fairly tried, the electric lighting poles should be removed. He had no wish to see the electric light done away with; but he had the strongest desire to see the injury removed which these unsightly poles inflicted on the parish. He moved that the inspectors be granted a rate of 1d. in the pound, which would be quite sufficient to carry them on to the next statutory meeting. After some discussion, an amendment that the rate be 2¼d. was proposed and carried. It was suggested, but the idea did not appear to meet with approbation, that a subscription list should be opened for placing the wires underground. From £12,000 to £15,000 would have to be provided.

BRUSSELS MUNICIPAL GAS SUPPLY.

The Gas Committee's Report for the Past Year.

The report of the Gas Committee of the Municipality of Brussels, on the working of the gas undertaking during the twelve months ending Dec. 31, 1889, was presented to the Municipal Council at their meeting on the 31st ult. Its chief features of interest, as far as our readers are concerned, will be found in the following abstract translation of the document.

The quantity of gas sold in the past year was 19,342,213 cubic metres, against 19,001,161 cubic metres in 1888—an increase of 341,052 cubic metres, or at the rate of about 1·8 per cent. Although this is rather a small advance as compared with that of 1888 over 1887, the Committee regard it as satisfactory, bearing in mind the fact that the high returns for the first-named year were due to the holding of the International Exhibition in the city.

The total quantity of gas produced in the past twelve months amounted to 24,814,030 cubic metres, as compared with 24,596,160 cubic metres in 1888. It was disposed of as follows:—

	Cub. Metres.
Night gas, at 15c. per cubic metre	15,615,426
Day gas, at 10c.	1,978,047
Municipal establishments, at 10c.	774,611
Gas-engines, at 10c.	632,812
Industrial purposes, at 10c.	125,352
Illumination devices, balloons, &c.	147,186
Artizans' dwellings and miscellaneous	68,779
Total sold	19,342,213
Public lighting and illuminations	3,600,900
Used on the works, &c.	842,496
Unaccounted for	1,028,421
Total production	24,814,030

The consumption of night gas last year exceeded by 315,974 cubic metres that of the preceding twelve months; but the Committee estimate at 200,000 cubic metres the decrease in consumption due to the adoption of the electric light. On the other hand, there were sold 94,458 cubic metres more day gas than in 1888. The loss of gas by leakage amounted to 1,028,421 cubic metres, or 4·14 per cent., as compared with 4·51, 5·27, and 5·94 per cent. in the three preceding years. The mains were extended by about 650 yards; and the total length on Dec. 31 last was 179,546 yards. The number of meters in use at the close of last year was 13,058, of which 6094 were double-index meters; representing together 225,342 burners. As in the case of the Paris Gas Company, the gratuitous fixing of pipes to convey the gas to the upper "flats" of houses greatly stimulates consumption by the occupiers of apartments. The number of consumers served in this way almost doubled in the course of last year. On Dec. 31, 1888, there had been fixed 221 of these rising pipes, supplying 270 meters; on the corresponding date last year there were 474, supplying 517 meters. Of course, there was a marked increase in the quantity of gas consumed—viz., from 108,000 to 159,000 cubic metres. The Committee continued last year, with good effect, their efforts to extend the use of gas among the tenants of the buildings belonging to the Municipality. There were 58 installations in apartments previously unprovided with gas; and 292 were altered or completed. At the request of tenants, 257 hot-plates were fitted up in the course of the year; making in all 373 supplied to this class of consumers up to the close of 1889. For the low rental of 3 frs. per annum, the Committee have let out on hire 139 roasters. The gas consumed by the occupants of the municipal buildings whose installations have been completed has increased to the extent of 25 per cent. A suitable return has, therefore, been received on the money spent in this section of the Committee's work, which amounted at the end of last year to a total of 18,531 frs. The use of gas for motive power has made little advance since the previous report—only one additional gas-engine having been fitted up during the past twelve months. Considering that the gas employed for motive power is supplied at two-thirds the ordinary rate, its use for this purpose should present great advantages to manufacturers, especially in view of the rise in the price of coal. The public lighting of the city is mainly by gas; but electricity is partially employed, and a general scheme of electric lighting from a central station is in contemplation by the Municipality. At the close of last year there were in use 5367 gas-lamps, as against 5157 at the end of 1888. Of the total number, 257 were supplied with high-power burners, and 603 were extinguished after midnight.

With regard to manufacturing operations, the coal contracts were renewed last June at an increased rate of nearly 2 frs. per ton, as compared with 1888. The quantities were: 54,000 tons from Belgium, 22,000 tons from England, 15,000 tons from France, and 6000 tons from Scotland. The average price of the coal carbonized last year was only 1fr. 59c. per ton higher than that for 1888; a portion of the coal purchased in the last-named year having been utilized. The increased cost of the raw material was compensated for to only a very slight extent by the higher value of residuals; consequently, the net cost of gas was raised, and the profit on the working reduced. The high price of domestic coal gave considerable stimulus to the demand for coke, which sold well, especially in the last months of the year. The retail sales over the twelve months rose to 506,056 hectolitres, or about 1,392,000 bushels, as compared with 402,304 hectolitres, or 1,106,000 bushels, in 1888. New machines for classifying the coke (which is found to aid consumption, by meeting the requirements of purchasers in regard to size) have been fitted up at the works; and this plant is now capable of dealing with a production of about 11,000 bushels per day. The breeze mixed with pitch is utilized for the manufacture of compressed fuel, which is employed for heating the furnaces.

Turning to the financial part of the report, we find the expenditure charged to capital account last year amounted to 438,779 frs., specially voted by the Municipality; bringing up to 14,226,787 frs. the amount sunk in the undertaking. Of last year's expenditure, the largest item was 261,145 frs. for the new gasholder. Beyond the above-named sum of 438,779 frs., there was other expenditure on the works, which,

as before, was defrayed out of revenue. The following are the principal items in the expenditure and revenue accounts :—

Expenditure.

	Francs.		Sterling.
Manufacture—			
Coal and other carbonizing material.	1,313,598	..	£52,544
Purifying materials	23,911	..	957
Engine fuel, &c.	35,936	..	1,437
Salaries and retort-house charges	259,683	..	10,387
Transport of material	118,866	..	4,754
Maintenance of works and plant	292,526	..	11,701
Contribution to workmen's fund	4,795	..	192
Miscellaneous	36,986	..	1,479
Distribution—			
Public lighting	95,225	..	3,809
Main and service laying, maintenance, &c.	156,518	..	6,261
Meters, meter repairs, and testing	44,055	..	1,762
Salaries, wages, and workshop expenses	72,644	..	2,906
Contribution to workmen's fund	1,733	..	69
Contribution to Belgian Association of Gas Managers	8,000	..	320
General expenses	4,672	..	187
Office and other expenses	201,275	..	8,052
Total	2,670,423		£106,817

Revenue.

	Francs.		Sterling.
Sale of gas	2,716,195	..	£108,648
Do. coke	822,935	..	32,917
Do. tar	104,948	..	4,198
Do. ammoniacal liquor	98,547	..	3,942
Do. spent purifying material, &c.	39,495	..	1,580
Meters, services, and fittings	124,863	..	4,994
Miscellaneous	132,942	..	5,318
Total	4,039,925	..	£161,597
Deduct expenditure.	2,670,423	..	106,817
Balance in favour of Municipality	1,369,502	..	£54,780

The budget estimates for the year were: Receipts, 4,000,000 frs.; expenses, 2,500,000 frs. So that the estimated surplus of 1,500,000 frs. was not reached by 130,498 frs. It should be pointed out, however, that the expenses incurred in extending and improving the works and plant which were defrayed out of revenue—amounting to 82,845 frs.—make the real profit on the year's working 1,452,347 frs. (£58,094).

BLACKPOOL CORPORATION GAS SUPPLY.

A Year's Working—The Reserve Fund.

At the last Meeting of the Blackpool Town Council, the presentation of the minutes of the Gas Committee afforded the Chairman (Mr. Hall) an opportunity of making a few remarks on the progress of the gas undertaking during the past financial year. He said that in the twelve months ending the 25th of March last a total quantity of 14,695 tons of coal and cannel had been used at the gas-works, at an average cost of 12s. 8d. per ton, or slightly less than the estimated price. There had been made during this period 145 million cubic feet of gas, or about 15¼ millions more than in the previous year. This increase was in a great measure accounted for by the larger number of gas-cooking-stoves in use in the town; and it was expected that the consumption of gas for this purpose would be still greater during the present year. The gas-works (which are under the management of Mr. J. Chew) were carried on in the most economical manner, and were very prosperous; and it would be gratifying to the Council to know that the profits would be a little more than for the previous twelve months. The increase in the wages of the stokers—a most deserving body of men—and the rise in the price of coal would, it was expected, result in the profit not being so large during the current year. It was estimated that the quantity of coal and cannel required for the gas-works in the ensuing twelve months would be from 16,000 to 17,000 tons.

At the Blackpool Town Hall on the 2nd inst., Mr. E. Burd, one of the Local Government Board Inspectors, held an inquiry respecting the application of the Blackpool Corporation for a Provisional Order to authorize the establishment of a gas reserve fund. Mr. Handley, the Borough Treasurer, said that the amount spent on the gas-works on capital account up to the 25th of March was £60,000, four-fifths of which represented the manufacturing, storing, and distributing apparatus. The sinking fund on the capital account was £9747; the average time of payment being 42 years. The profit for the year ending March 25, 1889, after setting aside interest on the sinking fund, and 1 per cent. on renewals, was £3560, which practically went in aid of the rates. The gas was sold to consumers at 2s. 6d. per 1000 cubic feet. The Council had for the last seven years set aside for the renewal fund 1 per cent. of the entire capital outlay; and the total amounted to £3553. Unfortunately, however, this fund had not had time to accumulate; and the demands upon it had left only about £600 in hand. Doubts had arised whether the Corporation were strictly entitled to set aside from the gas funds the usual amount to form such a reserve fund; and it had been suggested, to cover this, that application should be made to the Local Government Board, with the view to the starting of a depreciation fund, like that which would be commenced in the case of ordinary proprietors of gas-works, to cover renewals, depreciation, extraordinary outlay, wear and tear, and accidents, and to equalize the amount of profit appropriated each year in aid of the rates. It was proposed to make the amount placed to the reserve fund not a compulsory but a permissive contribution; the fund at no time to exceed £10,000. No witnesses were called; and the inquiry terminated at the close of Mr. Handley's remarks.

BURNLEY CORPORATION GAS AND WATER SUPPLY.

The Extensions at the Gas-Works—Local Government Board Inquiry.

At the last Monthly Meeting of the Burnley Town Council, Alderman Collinge moved that the Gas Committee be authorized to advertise for tenders for the erection of a new retort-house at the gas-works. In doing so, he said the Committee had considerably modified their views with regard to the retort-house. It would be one-third the size originally intended; but it would be so arranged that it could be added to as required until it reached its original dimensions. The new retorts would be capable of producing 1,250,000 cubic feet of gas per day. The Committee did not intend to spend at the outset more than £10,000, which would meet their requirements for four years. It was proposed to introduce the Coze system of retort-settings, which would effect a complete revolution in gas stoking. The motion was agreed to.

Last Wednesday, an inquiry was held at Burnley, by Mr. Arnold Taylor, one of the Inspectors of the Local Government Board, into applications to amend certain Acts so as to enable the Corporation to borrow further money not exceeding £100,000 for gas and water works purposes, and in order to lay out certain lands as a public park. The Town Clerk (Mr. Fox) explained that the following were the requirements for the different public works :—For the purchase of the Pillingfield Mill, £3500; gas-works, £11,000; water-works, £21,000; sewage, £30,000; street improvements, £10,000; river improvements, £10,000; park, £12,000; and markets, £12,000. Respecting the water-works, Mr. Alderman Sutcliffe, the Chairman of the Water Department, intimated that the Committee had abandoned the Swinden Valley site for the construction of a reservoir in favour of that at Cant Clough. The Corporation did not have an Omnibus Provisional Order, but applied only for specific Orders. They did not know whether work might be undertaken in the Swinden Valley in one or in ten years. For all practical purposes that scheme was given up without any reference to its engineering capabilities. The Town Clerk remarked that they required £35,000 to complete the Cant Clough scheme. The actual amount was estimated at £31,000; but £35,000 had been mentioned, in order that they might be quite on the safe side. Regarding the utilization of Pillingfield Mill for gas-works purposes, the Town Clerk read a minute of the Gas Committee recommending that application should be made for power to acquire this property for gas making. Mr. Creeke, on behalf of a local firm of corn millers, objected to the manufacture of gas on that site. The Town Clerk said it was not the intention of the Council at present to manufacture gas on the premises; but they did not know what they might do in the future. Mr. Alderman Greenwood considered it a mistake to import the question of gas making on the site into the matter; and he was sorry the Committee had acted, as they appeared to have done, on the suggestions of the Local Government Board. Mr. Creeke did not object to the department having the property; but he asked that its use should be restricted. The other matters embraced in the application having been inquired into, the proceedings terminated.

COLONIAL GAS UNDERTAKINGS.

In the JOURNAL for the 18th ult., we gave some particulars respecting the progress of certain colonial gas undertakings. The reports of other Companies have since reached us, and are noticed below.

At the recent annual meeting of the Auckland (N.Z.) Gas Company, the Directors reported that the prospects of the Company were so good that they intended to reduce the price of gas from 7s. 6d. to 6s. 8d.—a reduction of 10d.—per 1000 feet. The accounts presented showed a net profit for the year of £22,086; and there was a balance of £13,169 from the previous year. Dividends were declared as follows :—8s. 6d. per share on the fully paid-up shares, and 4s. 3d. on the shares half paid up; leaving £3934 to be added to the reserve fund, and £3310 to be carried forward.

At the 24th annual meeting of the Christchurch (N.Z.) Gas Company, the report presented by the Directors stated that the accounts for the year 1889 showed the effect of the reductions in the price of gas made during the latter part of 1888; the profit for the year being £2872 less than was shown in the previous balance-sheet, and £6537 less than in that of 1887. Reference was made in the report to the negotiations (already mentioned in the JOURNAL) which had been going on for some time between the Directors and the City Council, which had resulted in the Board agreeing to abolish the meter-rents, and to reduce considerably the price for lighting the public lamps, upon the Council entering into a contract for a term of three years for lighting the city, and also undertaking to abandon for a period of seven years the idea of erecting gas-works of their own. The balance to the credit of the profit and loss account for the year, including the sum brought forward, amounted to £10,210. In July last an interim dividend of 5 per cent. was declared, which absorbed £5000. Provision had been made to pay a further dividend of 5 per cent. (making 10 per cent. for the year), and to carry forward the balance of £210. The Directors expressed regret that the figures were not so satisfactory as they had been in previous years; the consumption not having increased sufficiently to compensate for the large concessions in price to which effect was given in September, 1888. The abolition of meter-rents would, it was stated, cause a still further reduction in the Company's revenue; but no effort would be spared by the Board to compensate for this loss by the exercise of further economy in management, and by stimulating increased consumption of gas. Regret was expressed at the loss the Company had sustained by the death of their Manager, Mr. J. Marriott, who had been in their service for upwards of eight years; and the appointment, as his successor, of Mr. D. B. Mackenzie (son of Mr. W. Mackenzie, of Dunfermline) was mentioned. The Chairman (Mr. E. G. Wright), in moving the adoption of the report, remarked that the accounts for the past year were perhaps the most unsatisfactory which had been laid before the shareholders for the past 21 years; and he could only hope that the next would be more gratifying. The year had been one of negotiation and compromise. At one time it appeared that the Company's opponents would be content with nothing less than the establishment of opposition

(Corporation) gas-works. They were not willing even to enter upon the consideration of the purchase of the existing works upon a fair basis; and it was nothing but the lack of parliamentary powers which prevented them from launching into the construction of competing works. However, since the past session more moderate counsels had prevailed; and negotiations having been re-opened, they resulted in the Directors practically agreeing with the City Council to light the public lamps and to maintain the present charge of 7s. 6d. per 1000 cubic feet to the public for a period of three years, with a further engagement that the City Council should not seek parliamentary powers or promote rival works for a further period of four years. This would practically give the Company peace and quietness for seven years to come; and it would probably enable the Directors to reinstate the business of the Company upon a more satisfactory footing. They would have to economize to the utmost in the management, and do their best to stimulate increased consumption of gas. He was glad to say that already there were signs of improvement in this direction; and when it was once understood that all differences between the Company and the Council were at an end, he thought it probable that there would be a further substantial augmentation of the consumption. The only matters about which there was any difference between them were of a minor nature; and he had no doubt the Directors would be able to come to terms with the Council, and have the agreement signed without much delay. The motion was adopted, and the dividend recommended declared. A vote of thanks having been passed to the Directors, one was proposed to the staff. In supporting the latter, the Chairman referred to the appointment of Mr. Mackenzie as Manager, and to his capability of efficiently discharging the duties of the office. The vote was accorded, and acknowledged by the Secretary (Mr. R. C. Bishop).

There was a steady and satisfactory increase in the business of the Launceston (Tasmania) Gas Company in the six months ending Dec. 31 last. This the Directors hope will continue, so that they may be enabled to still further reduce the price of gas, the use of which is daily becoming more popular for lighting, cooking and heating, and motive power purposes. The amount standing to the credit of the profit and loss account at the close of the year was £3132, out of which an interim dividend at the rate of 11 per cent. per annum has been declared. The quantity of coal carbonized in the past half year was 2301 tons of Newcastle and 136 tons of shale; the bulk of gas manufactured being 24,268,800 cubic feet. At the meeting of the Company, the Chairman (the Hon. W. Hart) referred to the great increase which had taken place in the consumption of gas both for lighting and heating purposes; and said the Directors wanted to stimulate as much as possible its use for cooking. Though that was not done so much in Launceston as in other places, the progress was steady and encouraging. The proprietors would be asked to sanction the issue of debentures, which had become necessary owing to the large extension of works (which are under the management of Mr. T. S. Cleminshaw). They had an overdraft of £8822 at the bank; and there was a sum of £4482 owing to the agents in London; and it was thought desirable to raise money by the issue of debentures, rather than by increasing the number of shares, to pay off these amounts. A resolution was passed sanctioning the raising of a sum not exceeding £30,000 in the way suggested.

The Latrobe Gas Company, Limited, is a comparatively new Tasmanian undertaking which, according to the third annual report of the Directors, which was presented to the shareholders at their recent meeting, although small, is making steady progress. The works are managed by Mr. H. S. Wark, with Mr. Cleminshaw (of Launceston) as Consulting Engineer; and last year they carbonized 138 tons 16 cwt. of coal, and produced 1,317,080 cubic feet of gas, or at the rate of 9488 cubic feet per ton. The balance at the credit of the profit and loss account at the close of the past year was £205, from which the Directors recommended the payment of a dividend at the rate of 7 per cent. per annum. This was agreed to. On the occasion of the meeting, Mr. Cleminshaw, to whose ability in designing and superintending the erection of the works the success of the enterprise is largely due, inspected the plant, and reported to the Directors that everything was in very good order.

The result of the working of the Brisbane Gas Company in the latter half of last year was a profit of £10,128; and the Directors advised the shareholders to dispose of the amount in the following way:—Dividend for the six months at the rate of 10 per cent. per annum, £6995; to be carried forward, £3133. According to the report of the Directors, the Company have not been on very good terms with the South Brisbane Gas Company—a competing undertaking. During the past half year, however, negotiations were concluded whereby the river upon which the town is situated, and from which it takes its name, has been made the boundary line between the operations of the two Companies; each taking over the plant laid down within their own area by the other. The Brisbane Company receive from the South Brisbane Company, under this arrangement, the sum of £4000. The price of gas has been fixed at a maximum of 6s. per 1000 cubic feet net; being 9d. per 1000 feet less than the net price which was being charged at the commencement of the competition. Several important extensions are being carried on in the suburbs. With regard to the works (which are under the supervision of Mr. J. H. Thomlinson), the duplication of the retort-house is nearly completed; and additional beds of retorts can now be fitted up as required.

Another Queensland gas undertaking—the Maryborough Gas and Coke Company, Limited—did not have a very flourishing time in the second half of 1889. In the first place, business in the town was in a very depressed condition; then the Municipal Council caused the Company some trouble and expense by altering the level of certain streets, thereby necessitating the lowering of the mains. Consequently, the working did not produce the good results which might otherwise have been witnessed. However, the amount at the credit of the profit and loss account at the end of the year was £1517, which allowed of a dividend at the rate of 10 per cent. per annum. The Engineer and Manager (Mr. J. Henderson, C.E.) reports the whole of the plant to be in first-class order, and working satisfactorily; the result being that the gas supplied to the consumers is kept up to a high standard in regard alike to illuminating power and purity.

THE PUBLIC LIGHTING OF NEW YORK.

The Superintendent of Public Lighting in New York (Mr. M'Cormick) has lately issued his report for the past year, from which we take the following particulars.

The cost of lighting the public offices and maintaining and lighting the public lamps of the city of New York for the year 1889 was $638,098. Of this sum, $409,537 was paid for gas lighting, $127,677 for electric lighting, and $2626 for naphtha lighting. The gas for the public offices alone cost $38,460. The cost for gas for the annexed district, included in the above total, was $128,537. The whole number of public lamps of all kinds required for lighting, on Dec. 31, 1889, was 28,300. This was a net increase of 4120 during the year. The chief increase was in gas lighting. No less than 861 new gas-lamps were lighted during the year; while 286 gas-lamps were relighted, besides the 7121 brought into use again on account of the extinguishment of the electric lights. Only 19 new public electric lamps were lighted during the year, and 169 relighted; while 1371 were discontinued. About 56½ miles of street and 66 acres of park were lighted by electricity early in December; but at the end of the month, only 3¾ miles of street were thus lighted. The number of naphtha lamps increased during the year by only six.

The prices paid for lighting by the different methods vary widely, and apparently not at all according to the kind of light received. Thus the Equitable Gaslight Company, while compelled to pay 20 c. for each lineal foot of main they put down, are restricted to $12 per year for each lamp lighted. No other Company pay such tax on their new mains; yet the Consolidated Company get $17·50 per lamp, the Central Gas Company $27 per lamp, and the Northern and Yonkers Gas Companies each $28 per lamp per annum. In spite of this great difference in price, the Equitable Company are yearly increasing the amount of lighting they do for the city; and they now light 2685 lamps.

So far as quality of gas is concerned, it seems that the Equitable Company's gas ranks among the best. The average illuminating power of each lamp was 30·75 candles; while that of the Consolidated Company ranged from 21·13 to 30·64 candles at its different branches. The fact that one Company obtain $28 per lamp per annum without paying any tax on their mains, and another get only $12 per lamp, pay a tax, and furnish a good quality of gas, is at least noteworthy.

The variations in the prices for electric lighting were also considerable. The city paid from 23 c. per electric lamp per night, or $83·95 per annum, up to 50 c. per lamp per night, or $182·50 per annum. The highest-priced electric lamps were in the parks and on Broadway.

There are about 1228½ miles of gas-mains in the city, including 105 miles in the annexed district. Mr. M'Cormick expresses the opinion that gas must be the chief reliance for public lighting. He recounts the difficulty experienced with electric lighting during the past year, and says: "The experiences of the past would seem to indicate that the arc light, in its present stage, cannot be relied upon for artificial illumination with any degree of absolute certainty. There are too many possibilities of interruption. The electric current cannot be stored to any extent; and the lights can only be maintained while the wires are intact, and the plant at the generating station is in proper working condition." He further points out that gas never fails; and adds that, with the ten gas-works on Manhattan Island, there is no danger of failure.

Mr. M'Cormick is not satisfied with the manner in which the subways have been constructed. He says the gas-mains have in many instances been exposed and injured in the process, and leakage is likely to occur. They have also been covered with masonry, so that they cannot be reached. "It is a well-known fact," he says, "that a certain admixture of illuminating gas and atmospheric air forms a very explosive compound." This mixture, encountering the leakage of the electric currents which is sure to take place, he believes will constitute "a possible source of danger below ground;" and he says "no wonder need be expressed if accidents should occur in the future."

Improvements in gas-burners have been made very slowly. The first contract for lighting the streets of New York City by gas was made in 1823. The burner then adopted had a capacity to consume 3 cubic feet of gas per hour. After nearly 67 years, "no advance has been made in the size of the public lamps," though in other cities much larger burners are used. Mr. M'Cormick would like to see introduced an improved public lamp, consuming 14 cubic feet of gas per hour, which was exhibited in different parts of the city during the year. He says that the residents of the various localities in which these lamps have been used are unanimous in their praise, and have urgently asked for their retention. He therefore favours trying these lamps on one of the principal avenues from which the electric lights have been shut off, and in which there are no subways.

It appears from the report that the public lamps of New York are selected by the unruly street boys as special objects on which to exercise their propensities for destruction. When the lamps are not used, the glass lanterns are quickly shattered by base-balls, bean-shooters, &c.; and even lamps regularly in use suffer greatly. The number of sheets of glass broken in the public street lamps during the past year was 139,500; and more than 1200 of the Boulevard lamp globes were damaged.

The Rating of the Otterbourne Water-Works of the Southampton Corporation.—At the Hants Quarter Sessions last Tuesday, the Chairman (Mr. W. C. D. Esdaile) pronounced the judgment of the Court in the appeal of the Southampton Corporation from the assessment made by the Hursley Union on the Corporation water-works, buildings, land, &c., at Otterbourne. The case, it will be remembered, was argued at great length at the last Quarter Sessions (*ante*, p. 69). The Chairman said that, after careful consideration, the Court had come to the conclusion that the assessment was a proper one; and they therefore gave judgment for the respondents with costs. Mr. Bullen, for the appellants, asked for a stay of execution, so as to allow them to consider the advisability of an appeal being entered; and this was granted.

ANTWERP WATER-WORKS COMPANY, LIMITED.

The Annual Meeting of this Company was held last Thursday, at the London Offices, 86, Cannon Street, E.C.—Mr. EDWARD HORNER in the chair.

The SECRETARY (Mr. W. Conway) read the notice convening the meeting; and it was agreed to take as read the Directors' report, an epitome of which was given in the JOURNAL last week (p. 660).

The CHAIRMAN, in moving the adoption of the report and accounts, said that circumstances had arisen which, he believed, would materially improve the position of the concern. Mr. Crew, one of the members of the Board, had been out to Antwerp, and, with the new Manager (Mr. Ad. Kemna), had investigated the affairs of the Company; the result being that there would be savings in the working expenses amounting to probably £900. Referring to the change in the management, he said that Mr. Kemna was a native of Antwerp. He was a chemist, and had for several years studied the question of the quality of the water. He had great confidence in the future of the Company, as was shown by the fact that he had invested £1000 in their shares; and these he had handed over to the Directors as security. He asked Mr. Crew to give the shareholders some details as to the working of the undertaking.

Mr. C. CREW seconded the motion. In the course of a long speech, he stated that the income of the Company from all sources had increased during the year by £1552; while the advance in 1888 was £949. The capital account had only grown to the extent of £1232; and he did not think that there would be any substantial increase of capital for some time to come. During the past year they paid £300 to an independent commission of chemists who were appointed to analyze the water supplied to the city. These gentlemen having finished their labours, they would not again have to expend this amount; and by the appointment of Mr. Kemna in place of their late Manager (Mr. Devonshire), they would save a further £360. In the general charges, he believed there would be a reduction of from £300 to £400; so that he calculated they would have a less expenditure during the current half year by about £900. It was proposed that they should now commence an amortization or sinking fund, by setting aside £800 out of their credit balance. He pointed out that one of their large customers had sunk an artesian well, from which he obtained water good enough for trade purposes; and this system of obtaining water he (Mr. Crew) was afraid would spread. The Company could not compete with the artesian wells; and so in the future they would have to devote their attention more to domestic than trade consumption. Everything was proceeding satisfactorily at Antwerp; and he considered the prospects of the Company were good.

A large number of questions were asked by shareholders, and were satisfactorily answered by Mr. Crew.

The report was subsequently adopted.

A resolution was then adopted, on the motion of the Chairman, seconded by Mr. ROLANDI, by which it was agreed to place £800 of the balance of profits to an amortization fund.

The proposal to re-elect the retiring Directors (Messrs. Horner and Blaber) gave rise to a considerable amount of discussion. Some of the shareholders strongly urged that the number of the Directors should be reduced from six to five—the minimum allowed by the Articles of Association; and one gentleman suggested that the time had arrived when Mr. Horner should relinquish his seat on the Board. The retiring Directors were, however, re-elected.

Mr. KEMNA next addressed the meeting; speaking of the policy which he should adopt in the management of the undertaking, and stating that he believed there was a bright future for the Company.

The proceedings then terminated.

The Leicester Corporation and the Water Supply of Barrow-upon-Soar.—The Barrow Parochial Committee have recently been negotiating with the Leicester Corporation Water Committee for a supply of water; and on the 31st ult., they resolved to recommend to the Rural Sanitary Authority of the Barrow Union "that an agreement should be entered into with the Corporation of Leicester to distribute water from their mains into the village of Barrow-upon-Soar, the charge for the same not to exceed the rates charged in Leicester, and that such water supply be laid on within twelve months from the passing of their Bill now before Parliament." The Rural Sanitary Authority on Tuesday approved of the recommendation, and instructed the Clerk to proceed in the matter.

The Gas Workers' Union and the South Metropolitan Notice.—At a mass meeting, convened by the National Union of Gas Workers, held at the St. Pancras Railway Arches last Sunday week, reference was made to the decision of the Directors of the South Metropolitan Gas Company not to employ members of the Union. The Chairman (Mr. J. Franks), in the course of his address, remarked that the King's Cross branch of the Union had attained its first anniversary; and he hoped the members were as determined to stick to the Union as they were a year ago. They must admit that the Union had sustained a defeat at the hands of Mr. Livesey, though it was not so serious as their opponents represented. The strike cost the men £10,000. But it had cost Mr. Livesey ten times this amount; and his temporary triumph was by no means one of which he could feel proud. He (Mr. Franks) counselled the men not to be disheartened, and to strive to get all workers federated into one gigantic body. Mr. J. May, alluding to the proposal to present a testimonial to Mr. Livesey for his conduct during the strike, asked from whom it was to come. Was it to come from the workers? On the contrary, the subscription list was made up of men of title and capitalists, who were not ashamed to support a gentleman who had tried his best to impose on his men unreasonable hours and inadequate pay. Mr. W. Thorne, General Secretary of the Union, said Mr. Livesey had resolved not to employ Union men; but they meant to do all in their power, by moral suasion, to induce labourers not to go into the South Metropolitan Gas-Works so long as this rule existed. The meeting closed with a unanimous expression by all present of their determination to support the Union.

GAS ENTERPRISE IN SOUTH AMERICA.

Completion of Gas-Works for Parana—The New Gas-Works for Buenos Ayres.

We learn from a letter recently received from an esteemed correspondent in South America, that the gas-works which have been for some eighteen months in course of erection, from the designs and under the supervision of Mr. G. E. Stevenson, M. Inst. C.E., of Buenos Ayres, for the supply of the city of Paraná, have been completed and put in operation. As this is one of the latest evidences of the extension of gas enterprise in far-off lands, the following particulars of the undertaking will doubtless be interesting. The city of Paraná—the capital of Entre Rios, in the Argentine Republic—has a population of rather more than 20,000 inhabitants. It is situated on the River Paraná, in the highway to Paraguay, and is from 350 to 400 miles distant from Buenos Ayres, whence it is reached by steamboat. The gas-works (the erection of which was greatly retarded owing to delay in the delivery of the materials, and in their transport to the site) have been constructed for an immediate production of 100,000 cubic feet of gas per diem, and are capable of doubling this make by the addition of another bench of retort-settings and a second gasholder. The holder and other plant were erected under a contract with Messrs. Ashmore, Benson, Pease, and Co., Limited; and it included everything but the buildings, which were put up by local contractors. The works were inaugurated on the 15th of February, the day before the commencement of Carnival. On the three following days there were illuminations to the extent of 3000 lights; the capacity of the works being pretty fully taxed to meet the consumption of gas. The Municipality have contracted for 500 public lamps; and it is expected that at the end of the present year the Company will have from 800 to 1000 private consumers on their books. Many of the inhabitants had, of course, never seen gas lighting in their lives before; and our correspondent states that some persons occupying high positions in the town, whilst gazing at the phenomenon of a gasholder filled with gas, ventured to ask if it were at all likely to explode whilst they were looking at it. The extent of mains is about 18 miles—the principal one being 10 inches in diameter; and so favourably are the works situated with regard to the city, that a pressure of 8-10ths at the governor sufficed to give not less than 10-10ths in every part of the district during the illuminations. This is the second gas-works constructed in the Argentine Republic with entirely local capital, and initiated purely by native capitalists.

Our readers will probably remember that new gas-works of some magnitude are now being erected, under Mr. Stevenson's supervision, and in accordance with his plans, for the supply of Buenos Ayres. These works are approaching completion; and when they are finished they will enter into competition with those of the existing Companies, without possibly doing them very much harm. The increase in the population of Buenos Ayres has been so rapid during the last few years, and the extension of the city so great, that there is a large field for the supply of gas which has scarcely yet been touched. The mains of the new Co-operative Company embrace all this part of the city; and it is to be presumed that the principal portion of the business done by the Company will be located there. At the same time they have power to extend their mains in any direction; and the system of piping is so arranged that this can be done without difficulty. But it is not, we believe, intended, for other reasons, to enter into competition with the existing Companies in the heart of the city, unless circumstances should eventually prove it to be necessary. It has been thought by many that the new undertaking will be unable to compete successfully with the old ones. However this may turn out to be, the works and mains of the Co-operative Company are, we believe, of much greater capacity than those of the other Companies, while their capital is much less. It is also supposed that the depreciation of the currency makes it impossible for a new gas undertaking to be remunerative. This is regarded by many as a mistake, seeing that it is quite possible to obtain prices for the sale of gas which will yield an interest on the capital invested even with gold at 200 per cent. It is confidently believed that any gas undertaking which at the present moment can earn a reasonable dividend, will, when the financial condition of the country recovers its former position, reap an abundant harvest.

In connection with new gas undertakings, it may be mentioned that an attempt has been made to obtain a concession for the supply of water gas in Buenos Ayres; but it has not yet been granted, and, as far as we can learn, is not likely to be.

Leeds Corporation Water-Works.—At a meeting last Friday of the Leeds Corporation Water Committee, the Borough and Water-Works Engineer (Mr. T. Hewson) reported that the works at the Blackmoor Tunnel were progressing satisfactorily; 1625 yards being now completed. The reconstruction of the puddle-wall at the Eccup reservoir was also proceeding favourably. Although the leakage remains about the same—half a million gallons per day—the work of reconstruction begins to have a slight effect upon it, and appears to show that the right steps are being taken.

The Rating of Water-Works.—Reference was made to this subject by the Town Clerk of Leeds (Sir George W. Morrison) at the meeting of the Corporation Water Committee last Friday. He stated that the representatives of the Corporation of Wakefield had revived the question of the assessment of water-works which were the property of Municipal Corporations; and he reminded the members of the Bill he drafted on their behalf in 1884, and which had been approved by the Association of Municipal Corporations. The burdens imposed upon Corporations, he said, had increased rather than diminished since 1884; and there seemed to be a general opinion that the whole question ought to be dealt with. The Committee ordered that reports of the proceedings in 1884, including that of the deputation to the Local Government Board, should be forwarded to each member, with the view to a further consideration of the subject.

NOTES FROM SCOTLAND.

From our Edinburgh Correspondent.

EDINBURGH, *Saturday.*

One of the serious disadvantages of dual control has arisen in Arbroath in connection with a claim by Mr. David Watson, who, along with his family, suffered from gas suffocation on the morning of the 7th ult. The gas which entered Watson's dwelling was found to proceed from a main that had been fractured by a steam-roller which the Police Commissioners had been employing on the roadway. He made a claim upon the Gas Corporation for £20 as compensation. The Gas Corporation sent the claim to the Police Commission, because it was on account of the action of the steam-roller that the pipe had been damaged. Last week a Committee of the Police Commission unanimously agreed to deny liability; and to point out to the Gas Corporation that the gas-main was laid far too near the surface of the ground—only from 12 to 15 inches down—and that the pipe itself was quite rotten. As a matter of policy, this is a quite legitimate step for both bodies to take; but the circumstances which enable them to take it enormously increase the difficulties of obtaining redress.

Sheriff Grahame at Blairgowrie, on Saturday last, heard and decided a case of a peculiar nature. The local Gas Company sued the Police Commissioners for £7 4s. as due for 12 years' consumption of gas in a lamp in front of the branch office of the Bank of Scotland. Their original claim was for £22 4s. in respect of 37 years' consumption of gas; but after explanations by the Police Commissioners, the amount was reduced to the sum sued for. It was the belief of the Gas Company that the lamp was a private one, the gas for which was supplied through the meter in the bank premises; but in October last, while repairs were being executed, it was discovered that it was supplied direct from the Company's main. The evidence showed that the question of which of the lamps were public and which were private was investigated in 1882; and the Sheriff decided against the Gas Company, on the ground that, having made no claim between that time and now, they had lost their right to recover.

The question of whether gas and water fittings are fixtures has been raised in a litigation which has been instituted by the Marquis of Lothian against Messrs. Robert Craig and Sons, paper makers, Newbattle. Messrs. Craig are tenants of the Marquis, under a lease, of extensive paper mills beside the Dalhousie viaduct on the Waverley Railway. On account, I believe, of difficulties in connection with the purity of the River South Esk, which flows past their works and into the grounds of Newbattle Abbey—his Lordship's principal residence—they are about to remove their works to a site near the mouth of the river. Their lease expired at Martinmas, 1888, but was continued till Whitsunday next. In the process which has been raised in the Bill Chamber of the Court of Session, his Lordship seeks to interdict them from removing a cistern and water-fittings from the mill buildings and from the dwelling-houses at the mills, and also the gas-works and piping in and about the properties. He claims the gas and water plant as fixtures which a tenant is not at liberty to remove. In reply, Messrs. Craig say there is a clause in their lease which empowers them to remove machinery and apparatus, fixed or otherwise, which they may have put up, provided they repair any injury which they may do to the walls in removing them. The plant in dispute, they say, cost them £670. They offer to leave it if paid its value as fixed by arbitration; but this, they say, the Marquis of Lothian declines to do, and insists that they shall abandon it without remuneration. Lord Kinnair has passed the note for trial of the cause in the Court of Session proper, and granted interim interdict.

The surveyors in the employ of the Edinburgh Corporation Gas Commissioners are agitating for an improved scale of wages; and with a view to further their claim they have addressed a petition to the Commission, while they have also sent deputations to individual members of the Commission.

On Monday night, at a meeting of the Elgin Gas Commissioners, a report by Mr. Taylor, the Gas Manager, recommending an outlay of £2270 in altering and extending the gas-works, was unanimously approved of. It was also agreed to spread the outlay over a period of three years—the first section of the work to cost £850; the second, £840; and the third, £580. Mr. Taylor was instructed to advertise for estimates for the first section of the work.

The Edinburgh and District Water Trustees, at their meeting on Thursday, gave instruction to the Clerk to prepare the necessary discharges, in the Trustees' favour, of the old Water Company's preferable debt called up at Whitsunday, amounting to £10,800, and to reborrow the money on mortgage, under the Act of 1869, at 3½ per cent. for five or seven years. Instruction was also given to the Clerk to borrow a sum of £5000, under their Acts of 1880 and 1889, to meet the expenses of works at Rosebery and elsewhere. Mr. J. C. Dunlop raised the vexed question of the injury done to roadways by the opening of newly-paved streets, by calling attention to the fact that on May 4 last the Road Surveyor wrote to the Water Trust telling them that they were going to relay Broughton Road. Within the past month the road had been again torn up from end to end by the Water Trust. It had been laid down by the city at an expense of £3000; and he would like to know why the Water Trust did not lay their pipes down at the same time as the Gas Commissioners laid theirs, and thereby save the public a great deal of expense. In the course of a long and heated discussion, the explanation was given that when the paving was executed it was not intended to lay a new water-main in the street; but that it was afterwards done in consequence of a memorial from proprietors having been sent in, backed up by a letter from Mr. Wilkins, the Fire Master, who thought there might be an inadequate supply of water in case of a fire breaking out. Mr. Dunlop replied that this was just what he complained of. He thought it was the duty of the Engineers to have done the same as the Gas Commissioners, or they should have advised the Works Committee such a thing was necessary. He thought this was very reprehensible when there had been plenty of notice. Mr. Coyne, the Superintendent, excused himself by saying he never had a complaint as to the inadequacy of the main; and this called forth the retort from the Lord Provost that it was not a good principle to wait till there was a complaint, but that they should take steps to prevent anybody complaining. The subject was sent to the Works Committee to consider.

The new water-works for Kirkcaldy, which were opened last year, have been taken over from Messrs. John Ross and Son, the contractors. The total cost was £30,227 11s. 8d. It was reported to a meeting of the Water Trust last night, that mortgages falling due at Whitsunday had been renewed—some for seven years at 3¼ per cent., and others for five years at 3¼ per cent.

From our Glasgow Correspondent.

GLASGOW, *Saturday.*

At last Thursday's monthly meeting of the Coatbridge Town Council, there was submitted by Councillor Chisholm an exhaustive analysis of the local Gas Company's accounts for the year 1889, which had been remitted to him for examination by the Council. He reported that he had found them made up in the form prescribed by the statute, and that they had been duly audited. For the first half of the year the maximum dividends had been paid free of income-tax, and the second half-year's were paid less income-tax. During the year the price of gas had been reduced from 3s. 9d. to 3s. 4d. per 1000 cubic feet. The surplus revenue for the year had amounted to £461; but if all the gas had been sold at the lower rate, there would not have been any surplus. In the year 1888 the amount paid by the Local Authority for public lighting was £674 8s. 2d.; while last year the amount was £393 3s. 6d., or £231 4s. 8d. less. It was the opinion that the reduction in the price of gas would reduce the surplus revenue. Provost Alexander (a former Chairman of the Gas Company) said he had great pleasure in conveying to Councillor Chisholm the thanks of the Council for the great care which he had taken in the preparation of the report. At the same meeting a letter was read from Messrs. Graham, Crum, and Spens, Glasgow, with which was sent a copy of the Bill proposing to give powers to the police authorities to light common stairs and recover the expense thereof. The Bill was remitted to the Provost's Committee, with powers to petition in its favour. The Provost remarked that they would all be agreeable to have this done; and his inquiry as to where Mr. Lindsay was, was met by a reply from that gentleman to the effect that his stairs had all been lighted fifteen years ago. The Bill in question seems to have arisen with the Partick Burgh Commissioners and their Clerk. In the event of the Glasgow Boundaries Extension Bill being passed this session, the Stair Lighting Bill will be of no practical utility (even though it may have become an Act), inasmuch as the arrangements at present in vogue within the city for the lighting of common stairs will extend throughout the whole of "Greater Glasgow." The Stair Lighting Bill has been backed by Mr. J. Parker Smith (the new member for the Partick Division of Lanarkshire), Mr. James Caldwell (one of the Glasgow members), and Mr. J. B. Balfour (ex-Lord Advocate).

Before leaving Coatbridge gas affairs, I ought to mention that on the occasion of the last monthly meeting of the Directors of the Gas Company, an adjournment was made to the gas-works, which were carefully inspected. On returning to the Board-room, where the meeting was reconstituted, the Chairman (Mr. Henry M'Lachlan) drew attention to the fact that a vacancy had occurred in the directorate by the death of Mr. J. Taylor. It was agreed to fill up the vacancy by the appointment of Mr. W. Wilson, of the Coatbridge Works.

A meeting of the Johnstone Gas Commissioners was held on Tuesday evening, when the whole question of the extension of the gas plant was brought under consideration. After a long and earnest discussion of the subject in all its phases, it was agreed to ask a well-known gas engineer to prepare plans for the proposed extensions, which will include a new gasholder to provide double the present storeage capacity at the gas-works. The cost will be upwards of £3000; but the improved condition of the works will place the Gas Commissioners in a position to make a great increase to the town's gas supply as soon as that may be found necessary.

During last month the make of gas at the three stations of the Glasgow Corporation Gas Commissioners amounted to 271,339,000 cubic feet, as compared with 257,023,000 feet in the corresponding month of last year. These figures show an increase for the month of 14,316,000 feet, or almost 5½ per cent.

Some of the Scotch Gas Companies and Corporations whose gas requires for its high illuminating power the use of such rich cannel coals as Lesmahagow, Niddrie, Armiston, Dryden, Newbattle, &c., are beginning to look rather "glum" at the prospect that is before them in respect of the high prices which coalmasters and coal merchants are expected to quote when the contracting season again comes round. In some instances contracts should, in the ordinary course of events, have already been placed; but it has been deemed advisable here and there to delay going into the market, in the hope that the quotations may by-and-by be abated to some extent. I am told that it is somewhat difficult to get a quotation for Lesmahagow cannel; and that it is confidently believed that fresh orders for top quality cannot be booked at less than 45s. per ton. It is stated that this variety of coal is oversold at the low prices prevailing months ago, and it is exceedingly difficult to get early delivery guaranteed at the advanced prices now quoted. Some of the other varieties of cannel which I have mentioned are selling at 30s. per ton at the pits, which is, I am informed, at least double the price at which they could be obtained a year ago. This is rather a serious matter for those gas-supply concerns which have hitherto been in the habit of making gas having an illuminating power of 27 to 30 standard candles; and a feeling is now arising in favour of following the example of the Glasgow Gas Commissioners in supplying gas of about 22-candle power, such as can be produced from splint coals and from cannels which are very much more abundant than those specially named, and whose price cannot easily be run up to an exorbitant level. I am told that some gas managers are quite ready to recommend a reduction of illuminating power, in view of the condition of things now ruling in respect of the price of rich cannels; and it is confidently affirmed that if such a course be not adopted, it will be necessary to advance the price of the gas. Two managers of very large concerns have been mentioned to me as having come round to this reforming tendency. In the course of the next couple of months or so, when the new tenders for coal are under

consideration up and down the country, it will be seen whether the gas consumers or the proprietors of the rich cannel coals are to win the day.

It is announced to day that intimation has been given to the Glasgow municipal authorities on behalf of the Electric Lighting Department of the Board of Trade, to the effect that the Provisional Orders applied for by the Scottish House-to-House Electricity Company and by Messrs. Muir, Mavor, and Coulson, Limited, asking powers for electric lighting in Glasgow, will not be proceeded with. It seems that a general principle of action has been laid down by the Department, which is that where the Local Authorities have promoted Provisional Orders to provide electric light for the ratepayers, no private scheme will be officially countenanced.

The Glasgow pig iron market has again seriously declined in price, Scotch warrants having dropped fully 3s. 6d. per ton, and hematite iron about 5s. per ton. Cleveland iron, on the other hand, has been in request, owing to a scarcity of warrants for prompt delivery; and the price has fluctuated considerably between 52s. 9d. and 49s. 9d., advancing again to 52s., and closing yesterday afternoon at 49s. 9d. cash per ton. The Board of Trade returns were looked upon as rather unfavourable, and this fact seems to have had a considerable amount of influence in leading to heavy realizations on the part of holders, and the consequent severe fall in the prices of pigs. The quotations for makers' special brands are rather disorganized by the fall in the prices of warrants. It is stated that a reduction of 5s. per ton has been made in the price of Gartsherrie iron, and 3s. in the price of Eglinton iron. There are now 88 blast-furnaces in actual operation in Scotland, as compared with 89 a week ago, and 82 at this time last year. Large withdrawals from the public warrant stores are being daily reported, as also large shipments.

House coals are becoming easier in price, owing to slackening demand, but steam coal is keeping firm, and orders are being placed for the season's requirements. The output of main coal is going away with slight pressure, and the price is in favour of buyers. There is a moderate degree of activity in splint coal.

Proposed Extension of the Purifying Plant at the Carlisle Gas-Works.—At the meeting of the Carlisle Town Council last Tuesday, the Mayor (Mr. R. Forster) moved the adoption of a recommendation of the Gas Committee to borrow £6000 for proposed extension of the purifiers, purifying-house, and street mains, and for other works. He said that the subject had been before the Committee for some time. The present purifiers were not equal to the duties required of them. They were capable of dealing with a production of 500,000 cubic feet of gas per day; and at present 1 million feet per day were produced. When these extensions had been carried out, they should be able to purify something like 2 million feet per day; and this would meet their requirements for the next 25 years. Their Engineer (Mr. J. Hepworth) had been handicapped lately in keeping the gas up to its present standard, owing to the want of purifiers. Mr. Creighton seconded the motion, which was carried.

Northern Coal Tade.—The coal trade of the north of England has now recovered from the effect of the suspension of work during the holidays; and prices are reverting to the normal rate. Northumbrian steam coal is more in demand as the season for shipment to the Baltic is now at hand. For best qualities about 12s. 6d. free on board is the current price; and at about this rate some contracts have been entered into, whilst for others the rate offered is nearly 1s. less. Small steam coal is in considerable request at about 8s. Gas coal is being consumed in much smaller quantities; the local consumption being at present not much above half that of three months ago, and in a few weeks we shall arrive at the minimum. Some of the chief producers ask 13s. per ton free on board; but it is known that lower prices have been taken, though one or two contracts for export are believed to have realized nearly that sum. It is expected that in a week or two the gas companies will begin to stock coal more freely. Manufacturing coal is steady; but the supply is more abundant. Household coal is very much depressed—the fine weather having limited the demand. Bunker coal for steamships also commands a rather less price; the market being more fully supplied. Blast-furnace coke is lower in price, the reduced production of iron having affected the price of the fuel. For best Durham coke about 25s. 6d. per ton free on board in the Tyne is the current price. Gas coke sells freely, and commands a relatively high price.

Suffocation of Two Women at Leeds.—Shortly after midday last Saturday, a shocking discovery was made in the neighbourhood of Wade Lane, Leeds. At No. 10, St. John's Place, a narrow street leading off Wade Lane, lived an old woman named Mary Ann Croft and her daughter Mary Ann King. The former, it is stated, was upwards of 80 years of age, while the latter is supposed to have been between 50 and 60. The house in which they lived contained only a living-room and a bed-room. Last Friday both of the women complained of feeling unwell, but did not attribute the indisposition to any particular cause. During Saturday morning neither was seen about; and suspicion being aroused, the house was entered by a neighbour. As soon as she did so she was almost overcome by a strong smell of gas. A glance round the room revealed a sad state of affairs. On a bed-chair was lying the elder woman, dead; and at full length on the floor, with her head under an arm-chair, was the daughter, apparently lifeless. Assistance was procured, and attempts were made to restore animation in the daughter—unfortunately, without effect, as she died in a very short time. Meanwhile a plumber of the Corporation had arrived, and the supposed cause of the disaster was soon discovered. It appears that the gas-meter, which had been located in the living-room of the house, was removed on Thursday last. Presumably the pipe from which it had been disconnected was plugged. Whether this operation was ineffectually done, or the plug was afterwards tampered with, is not at present known; but on Saturday the gas was found to be escaping freely at this point. Of course, the plumber at once stopped the leak. The assumption is that the illness the women complained of was due to the gas fumes. Yet they never appear to have complained to any one about a smell of gas.

Coal Boring in the South of England.—An undertaking, with the title of the South of England Coal-Boring Syndicate, has been registered with a capital of £2000, in £1 shares, to search for coal and other minerals in Kent, Surrey, and Sussex.

The Plymouth Corporation Water Committee and the Recent Poll.—The rejection by the ratepayers of Plymouth of the Water Bill of the Corporation led nine of the most experienced members of the Water Committee to tender their resignations; and these were accepted by the Council last Wednesday. A great effort was made at the same time to fill up the vacancies; but out of several names which were mentioned, only four gentlemen were found willing to serve.

Enlargement of a Gasholder at Halifax.—The minutes presented by the Gas Committee at the last meeting of the Halifax Town Council embraced a paragraph stating that the tender of Messrs. Clayton, Son, and Co., Limited, of Leeds, had been accepted for the execution of the work required in the construction and erection of an outer lift, and alteration of guide-framing to No. 4 gasholder, for the sum of £6779. In moving the confirmation of the Committee's proceedings, Mr. Brook informed the members that the holder it was proposed to enlarge was erected eight or nine years ago, at a cost of £28,505, or £19 per 1000 cubic feet of space. The addition they proposed to make would cost about £8 per 1000 cubic feet. It was urgently needed, as would be seen by the fact that, whereas the present holder capacity at the gas-works was only 3 million cubic feet, they sent out, on Dec. 24 last, 125,000 cubic feet above this quantity. If an accident occurred to one of the holders at that time of year, it would place them in a position of some danger. The minutes were confirmed.

The Increase in the Price of Gas at Bristol.—In the short space of three months, writes "A Gas Ratepayer" in a Bristol contemporary, the Directors of the Gas Company have raised the price of gas by 5d. per 1000 cubic feet—equivalent to 20 per cent. on the former price. He describes this action of the Board as "high-handed" and "unfair to the public;" seeing that, by the published accounts, the Company have £41,600 reserved from profits made out of former payments of the consumers of gas. He questions the right or the legal authority of the Board in taxing the public to the extent of 20 per cent.; and concludes his letter by saying:—"The Gas Company is too heavy metal for individual consumers to tackle; but we have a right to look to the Corporation, as guardians of the public purse and of the public welfare, to see that the Gas Company does not exceed its powers, to the prejudice of the citizens. An addition of 5d. per 1000 cubic feet of gas means a contribution of more than £25,000 per annum from the city and neighbourhood, of which the Corporation will pay £2500 for public lighting. The Town Council would fail in their duty if they did not take care that this large tax is not imposed illegally and unnecessarily."

The Proposed Extension of the Mid-Kent Water-Works.—The Mid-Kent Water Company are seeking by a Provisional Order to considerably extend their mains in the populous parishes in the Malling Rural Sanitary Authority's area; and the proposal has been very favourably received in every district excepting that of Aylesford. The withholding of the consent of the Aylesford Authority has ended in Major Marindin, R.E., holding an inquiry, the result of which has been submitted to the Board of Trade. The Company contend that the water as at present supplied to the opposing district is not sufficiently good for the health of the inhabitants; being, from various causes, contaminated. This contention is borne out by the Medical Officer of Health for West Malling (Dr. Harris Butterfield), as well as by the District Medical Officer of Health (Dr. Muirhead). One of the points in dispute is the possible damage the proposed extension may cause to wells on Mr. Brassey's property, from which the present supply is drawn. But the Company say there is no probability of the springs being interfered with. Major Marindin expressed the opinion that the matter was one which ought to be settled by agreement between the promoters and the objectors rather than by a costly opposition; and so far as this is concerned, the Company have offered not to go within a reasonable distance (half a mile being mentioned) of Mr. Brassey's wells. The decision of the Board of Trade will probably be given at the end of the present month.

The Proposed Extension of the Colne Gas-Works.—Mr. J. T. Harrison, one of the Local Government Board Inspectors, recently held an inquiry at the offices of the Colne Local Board, respecting an application made by that body for power to amend the Colne Gas Act, 1879. Evidence of the increase in the consumption of gas was given by Mr. T. Varley, the Engineer and Manager. He said that in 1877 the number of retorts was 36, while now there were 132. The price of gas at the time of the Company was 4s. 2d., 3s. 9d., and 3s. 7d.; it was now 3s. 1d. and 2s. 9d. The average daily consumption was 370,000 cubic feet. The original cost of buying the works from the Company was £33,400; and £11,000 had been expended on them since. The price of gas would shortly be reduced uniformly to about 2s. 11d. per 1000 feet to mill-owners and others. The capacity of the two gasholders was 350,000 cubic feet. Mr. Pilgrim, representing certain property-owners contiguous to the site of the proposed extension, opposed the scheme if the owners were not to be compensated in some way. The Act specified that the works could not be extended within 300 yards of the property without the consent of the owners. It was now proposed to bring the works within 120 yards; and the owners objected to the serious diminution in value that would result if gas were stored so close to it. The property, which consisted of houses, was worth £1383 19s.; and the owners proposed that the Board should buy it. Mr. Atkinson, an Architect and Surveyor, said he estimated the depreciation would amount to £25 or £30 per house, and there were seven houses. The Clerk to the Board contended that the property would be improved by the new works, as there was a nuisance from the old ones which would be diminished by the more modern construction. The members of the Board retired to consider whether they could grant the compensation asked for by the property owners and ratepayers; and announced that they could not give their decision then, but would hold a special meeting on the matter. The Inspector said he would delay sending in his report until he heard from the Board. Mr. Harrison then visited the site of the proposed extension, and the inquiry terminated.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *April* 12.

Sulphate of Ammonia.—There has been a variable market; and the pressure of a few sellers to realize has brought about some decline in values. Sales have taken place at £11 10s. f.o.b. Hull, and even under; but the latter have been a few odd parcels, to which little importance need be attached. The consumptive demand should at this time of the year appear more freely; but, under the influence of depressing reports from this side, buyers seem to withhold orders until the last moment. Forward sales are almost entirely confined to Leith delivery, at £11 12s. 6d. to £11 10s. for six months contracts. In nitrate, the deliveries for consumption continue on a very extensive scale. Prices, however, remain without change. Cargoes at port of call are quoted 7s. 10½d., and spot value is 8s., closing quiet.

LONDON, *April* 12.

Tar Products.—The make of tar is falling off; and this, combined with the Dinsmore process restricting the quantity made, together with the large quantity now being used for asphalting, has caused sales at prices beyond its value, having regard to the price of tar products. Anthracene, carbolic acid, and pitch are all reported weak; whilst benzoles, solvent naphtha, and creosote oils are in good request at firmer prices. The following prices have been paid during the week:—Tar, 28s. to 31s. per ton, according to position. Pitch, 28s. to 30s. per ton. Benzol, 90 per cent., 3s. 6d. per gallon; 50 per cent., 2s. 7½d. per gallon. Toluol, 1s. 8d. per gallon. Solvent naphtha, 1s. 8d. per gallon. Crude naphtha, 1s. 2½d. per gallon. Light oil, 4d. per gallon. Lucigen oil, 2¾d. per gallon. Ordinary creosote, 2¼d. per gallon. Carbolic acid, 2s. 6d. per gallon. Anthracene (30 per cent.), "A" quality, 1s. 4d. per unit; "B" quality, 1s. 1d.

Sulphate of Ammonia.—The depression in this article continues; and very little business has been transacted during the week. Owing to the action of Scotch makers forcing stuff upon the market, prices have receded; and sales are reported at £11 5s. to £11 10s., less 3¼ per cent., according to position and delivery. Gas liquor, 5° Twaddel, is quoted at 8s. to 10s. per ton.

Sheffield Corporation Water Supply.—On the recommendation of their Engineer (Mr. E. M. Eaton), the Water Committee of the Sheffield Corporation have determined to extend their distributing system at an estimated cost of £12,279.

San Paulo Gas Company.—In their report for the half year ending Dec. 31 last, the Directors of the San Paulo Gas Company, Limited, recommend a dividend at the rate of 10 per cent. per annum. This will absorb £6041 of the amount available for division, and leave £1209 to be carried forward.

The Corporation of London and Electric Lighting.—In accordance with a suggestion thrown out some few weeks since, a deputation consisting of ten members of the London Commissioners of Sewers, last Friday, visited Taunton to inspect the system of public lighting by electricity adopted there.

The Salary of the Stalybridge Gas Manager.—This matter came before the Stalybridge Town Council at their meeting last Tuesday, when the recommendation of the Gas Committee that Mr. E. A. Loam should have an advance of £30 per annum (not £20 as stated in last week's JOURNAL) was agreed to.

Heywood Corporation Gas Supply.—At the monthly meeting of the Heywood Town Council last Thursday, the Chairman of the Gas Committee (Mr. Lawton) reported that the make of gas for the year ended the 25th ult. was 81,824,500 cubic feet—an increase of 5,782,500 feet compared with the preceding year.

Gas Supersedes Electric Lighting on the Promenade Pier, Plymouth.—The new promenade pier on the Hoe, Plymouth, is being considerably extended and improved. The electric light being found to be so costly, with frequent sudden extinctions during concerts or other entertainments, the Directors have abandoned this mode of lighting, and have engaged Messrs. Willey and Co., of Exeter, to fit the whole of the pavilion and pier with fittings and lamps for gas supply.

Increased Storeage at the Hindley Gas-Works.—At the meeting of the Hindley Local Board last Tuesday, the Gas Manager (Mr. W. Dickinson) reported that on the 7th ult. the large holder "blew" at the cup; causing a loss of about 35,000 cubic feet of gas. In view of the increase in the consumption, he was anxious that the question of increased storeage should be taken into consideration. It was decided that he should prepare estimates of alternative schemes for increasing the holder space; and a Committee was appointed to carry out the one they deemed best.

The Water Supply of Mumbles (Swansea).—In the JOURNAL a few weeks since (p. 558), reference was made to the unfortunate position of Mumbles in regard to its water supply; the Water Company having ceased to furnish water under circumstances then explained. The Company have recently announced that they are anxious the ratepayers should not be sufferers through the action of the Local Board; and that therefore they would again pump water into the reservoir, and continue doing so for two or three months—thus giving the inhabitants ample time to definitely arrange matters with the local authority.

Improvement of the Sea-Front at Ramsgate.—At a meeting of the Ramsgate Town Council last Thursday—the Mayor (Captain L. W. Vaile) in the chair—the following recommendations of the Sands and Approaches Committee were unanimously adopted:—"That Mr. W. A. Valon be appointed the Engineer to the Corporation for the purpose of preparing the plans and specifications to be annexed to the proposed agreement with the Board of Trade relating to the improvement of the sea-front; and that the plans and specifications relating to the proposed front improvements as now submitted by Mr. W. A. Valon be forwarded to the Board of Trade for their approval."

Darlington Corporation Gas and Water Undertakings.—At the last meeting of the Darlington Town Council, the Gas Committee presented their statement of accounts for the half year ending Dec. 31, which exhibited a profit of £3005. It was recommended that £1000 should be paid out of the profits towards the reduction of the general district rate. This was adopted; and it was decided to request the Dinsmore Gas Company, Limited, to send their Engineer to inspect the Darlington works, and give an estimate of the cost of applying the process to such portion of the works as may be approved of. The accounts of the Water Department for the half year were also laid before the Council. It was recommended, and agreed, that the sum of £500 should be paid out of the profits towards the reduction of the general district rate.

The Bolton Corporation Coal and Lime Contracts.—A singular proposition arising out of the recent discussion as to the coal and lime contracts was made at the meeting of the Bolton Gas Committee last Friday. One councillor moved that the Gas Engineer be called upon to resign, inasmuch as the complaints made by him to the Committee in regard to the inferior quality of the coal supplied by the contractors had not been upheld by the Town Council. It was pointed out that if the decision of the Council was a right and proper one, the complaints made by the Engineer were unfounded, and that, therefore, the Committee could not henceforth place implicit trust in him; a circumstance which only admitted of one alternative—viz., that he should be requested to resign. As may be imagined, the motion gave rise to a somewhat animated discussion, and in the end it was negatived.

The Proposed Extension of the Rochdale Gas-Works.—The Gas Committee of the Rochdale Corporation had under consideration at their last meeting the report of the deputation which has recently visited the Beckton works of The Gaslight and Coke Company, the Southall works of the Brentford Gas Company, and the Ramsgate Gas-Works. They recommended the Committee to ascertain the cost of erecting four settings of seven retorts each, and to give them a thorough trial, before finally deciding on the style of settings to be erected in the new retort-house which it has been decided to build; and to instruct the Manager (Mr. T. B. Ball) to ascertain the cost of applying the system of purification of gas by the application of oxygen, as shown to the Committee at Ramsgate, in the Rochdale works, and the amount payable for royalty to the patentees. The recommendations were adopted by the Committee, and have since received the sanction of the Council.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

For Stock Market Intelligence, see ante, p. 686.

Issue.	Share	When ex-Dividend.	Dividend or Int. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	16 Oct.	10½	Alliance & Dublin 10 p. c.	10	17½—18½	..	5 13 6
100,000	10	,,	7½	Do. 7 p. c.	10	12—13	..	5 15 9
300,000	100	2 Jan.	5	Australian (Sydney) 5 % Deb.	100	109—111	..	4 10 1
100,000	20	28 Nov.	8	Bahia, Limited	20	20—21	..	7 12 4
200,000	5	14 Nov.	7½	Bombay, Limited	5	6¼—6¾	+¼	5 11 1
40,000	5	,,	7½	Do. New	4	4¾—5¼	..	5 17 10
380,000	Stck.	27 Feb.	12½	Brentford Consolidated	100	217—222	..	5 10 4
125,000	,,	,,	9¼	Do. New	100	160—165	..	5 12 2
220,000	20	13 Mar.	11	Brighton & Hove Original	20	40—42	..	5 4 9
320,000	20	28 Mar.	11¼	British	20	45—46'	+¼	4 17 10
50,000	10	13 Mar.	11	Bromley, Ordinary 10 p. c.	10	18—20	..	5 10 0
39,000	10	,,	8	Do. 7 p. c.	10	13—14	..	5 14 3
328,750	10	14 Nov.	10	Buenos Ayres (New) Limited	10	12¾—13¼	..	7 8 2
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	105—108	..	5 11 1
150,000	20	27 Feb.	8	Cagliari, Limited	20	25—27	..	5 18 4
550,000	Stck.	16 Oct.	13⅜	Commercial, Old Stock	100	252—257	..	5 7 0
130,000	,,	,,	10½	Do. New do.	100	200—210	..	5 2 4
130,000	,,	30 Dec.	4½	Do. 4½ p. c. Deb. do.	100	118—123	..	3 13 2
557,320	20	12 Dec.	13	Continental Union, Limited	20	46—48	..	5 8 4
242,680	20	,,	13	Do. New '69 & '72	14	31—33	..	5 10 3
200,000	20	,,	10	Do. 7 p. c. Pref.	20	37—39	..	5 2 6
75,000	Stck.	28 Mar.	10	Crystal Palace District	100	195—205	..	4 17 7
234,060	10	30 Jan.	13	European, Limited	10	24—26	..	5 0 0
120,000	10	,,	13	Do. New	7½	18—19	..	5 2 10
354,060	10	,,	13	Do. do.	5	12¾—13¼	..	4 16 4
5,470,620	Stck.	13 Feb.	13⅜	Gaslight & Coke, A, Ordinary	100	249—254	..	5 8 3
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	100—103	..	3 17 8
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	250—255	..	3 18 5
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	121—125	..	4 0 0
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	180—185	..	4 1 1
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	160—165	..	4 4 10
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	247—252	..	3 19 4
1,061,150	,,	12 Dec.	4	Do. 4 p. c. Deb. Stk.	100	114—117	..	3 8 5
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	122—127	..	3 10 10
650,000	,,	,,	6	Do. 6 p. c. do.	100	160—170	..	3 10 7
3,800,000	Stck.	14 Nov.	12	Imperial Continental	100	219—224	..	5 7 1
75,000	5	12 Dec.	6	Malta & Mediterranean, Ltd.	5	5—5¼	..	5 9 1
560,000	100	1 Apr.	5	Met. of Melbourne, 5 p. c. Deb.	100	112—114	..	4 7 9
541,920	20	28 Nov.	6	Monte Video, Limited	20	18¾—19¼	..	5 3 1
150,000	5	28 Nov.	10	Oriental, Limited	5	8¾—9	..	5 11 1
60,000	5	28 Mar.	7	Ottoman, Limited	5	5¾—6	..	5 16 8
166,870	10	26 July	4	Pará Limited	10	3¾—4¼	..	8 17 9
				People's Gas of Chicago—				
420,000	100	2 Nov.	6	1st Mtg. Bds.	100	100—105	..	5 14 3
500,000	100	2 Dec.	6	2nd Do.	100	95—100	..	6 0 0
100,000	10	16 Oct.	10	San Paulo, Limited	10	14¾—15¼	..	6 9 2
500,000	Stck.	27 Feb.	13¾	South Metropolitan, A Stock	100	280—290	..	4 11 5
1,350,000	,,	,,	11½	Do. B do.	100	225—235	..	4 17 10
141,500	,,	,,	12	Do. C do.	100	235—245	..	4 17 11
650,000	,,	30 Dec.	5	Do. 5 p. c. Deb. Stk.	100	137—142	..	3 10 5
60,000	5	27 Feb.	11¼	Tottenham & Edm'nton, Orig.	5	11—13	..	4 8 5
				WATER COMPANIES.				
728,446	Stck.	30 Dec.	9¾	Chelsea, Ordinary	100	260—265	..	3 11 8
1,720,560	Stck.	16 Oct.	7½	East London, Ordinary	100	210—215	..	3 9 9
544,440	,,	30 Dec.	4½	Do. 4½ p. c. Deb. Stk.	100	143—148	..	3 0 10
700,000	50	12 Dec.	9	Grand Junction	50	120—125	..	3 12 0
708,000	Stck.	13 Feb.	10½	Kent	100	271—276	..	3 16 0
1,043,800	100	30 Dec.	9¾	Lambeth, 10 p. c. max.	100	254—258	..	3 13 7
406,200	100	,,	7½	Do. 7½ p. c. max.	100	197—202	..	3 14 3
200,000	Stck.	28 Mar.	4	Do. 4 p. c. Deb. Stk.	100	122—126*	..	3 3 6
500,000	100	13 Feb.	12½	New River, New Shares	100	363—368	+1	3 5 10
1,000,000	Stck.	30 Jan.	4	Do. 4 p. c. Deb. Stk	100	127—130	..	3 1 6
902,300	Stck.	12 Dec.	6	S'thwk & V'xhall, 10 p. c. max.	100	160—165	..	3 12 9
126,500	100	,,	6	Do. 7½ p. c. do.	100	155—160	−2	3 15 0
155,066	Stck	12 Dec.	10	West Middlesex	100	260—265	..	3 15 6

*Ex.div.

GWYNNE & BEALE'S PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: "GWYNNEGRAM LONDON." **GWYNNE & CO.,** TELEPHONE No. 2698.

HYDRAULIC AND GAS ENGINEERS, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

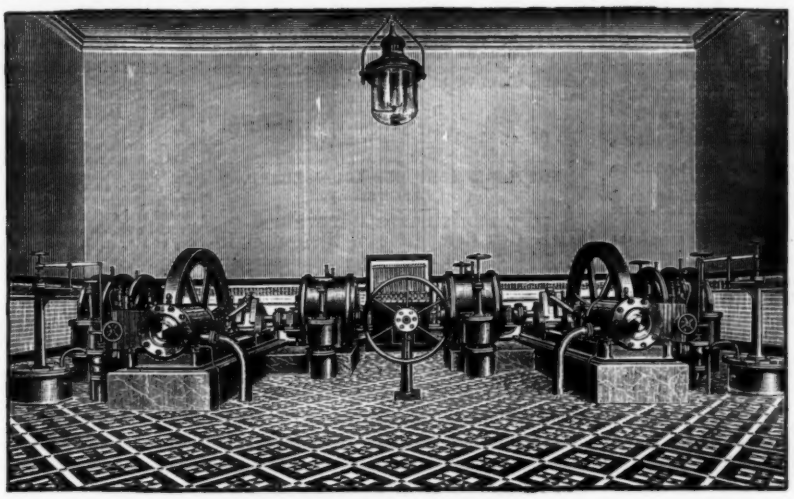
Thirty-three Medals at all the Great International Exhibitions have been awarded to GWYNNE & Co. for Gas Exhausters, &c.

They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality.

The result is that in every instance their work is giving the fullest satisfaction.

They have completed Exhausters to the extent of 28,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work, and can be referred to.

Catalogues and Testimonials on application at the above address.



Their Exhausters can be made, when desired, on their New Patent Principle, to pass Gas without the slightest oscillation or variation in pressure.

NO OTHER MAKER CAN DO THIS.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, STEAM-PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH-SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.

Only 75 Revolutions per Minute.

The above Engraving shows Two Engines driving Four GWYNNE & CO.'S PATENT NON-FLUCTUATING EXHAUSTERS, to pass 200,000 cubic feet per hour (without the slightest oscillation), at the EFFINGHAM STREET GAS-WORKS, SHEFFIELD.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAYS.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.
JOHN WM. O'NEILL, Managing Director.

CANNEL COAL, ETC.

JOHN ROMANS & SON, EDINBURGH. Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS AND WATER WORKS.
Prices, &c., will be forwarded on application to No. 20, ST. ANDREW SQUARE, EDINBURGH, } SCOTLAND.
No. 64, BERNARD STREET, LEITH, }

SULPHURIC ACID, B.O.V., for Sulphate of Ammonia Making. Guaranteed clear, of full strength, and to produce a fine white-coloured salt, Delivered in carboys or railway tank waggons.
For prices and terms address BALE, BAKER, AND Co., 120 & 121, Newgate Street, LONDON.

TAR and Liquor wanted.
BROTHERTON AND Co., Commercial Buildings, LEEDS.

TO EMPLOYERS OF GAS-FITTERS.

WANTED, a Situation for a good, steady, and reliable GAS-FITTER, one acquainted with every branch of the trade.
For character and ability, apply to T. LAYTON, Manager and Secretary, Gas-Works, REDDITCH.

WANTED, by an experienced Man, a SITUATION as WORKING FOREMAN. Is capable of taking charge of small Works. Can lay Mains, Services, and do General Repairs on the Works. Sixteen years' good character.
Address No. 1806, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at once, a good Gasholder ERECTOR.
Applicants must send testimonials, and state previous experience and wages required, to CLAYTON, SON, AND Co., LIMITED, Hunslet, LEEDS.

GAS-FITTER.

WANTED, by a Suburban Gas Com-pany, a first-class, steady WORKMAN, who would make himself generally useful. Wages, 8d. per hour.
Applications to be made, by letter, to No. 1808, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WORTHING GASLIGHT AND COKE COMPANY.

WORKING Foreman required by the Worthing Gas Company, carbonizing about 5000 tons of Coal per annum.
Applicants must be good Carbonizers, and thoroughly experienced in the management and control of Workmen. Wages £1 16s. per week, with House in the Works, and Gas free.
Written applications, accompanied by three testimonials of recent date, including (if possible) one each from present and last Employers, to be sent to Mr. WALKER, Gas-Works, WORTHING, on or before the 29th inst., endorsed "Application for Foreman."

TIMMIS & CO., of STOURBRIDGE, Make only the best quality of FIRE-CLAY RETORTS, BRICKS, TILES, & LUMPS. Also SPECIAL SILICA BRICKS, to stand great heats. All descriptions kept in Stock.
For Prices apply to JAMES LAWRIE AND Co, 1, Whittington Avenue, Leadenhall Street, E.C., Sole Agents for London and District.
Telegraphic Address: "EIRWAL, LONDON."

W. C. HOLMES & Co., Huddersfield, AND 80, CANNON STREET, LONDON, Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
*** See Advertisement p. 676 of this week's issue.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for Wet and Dry Gas-Meters, Station Meters, and Governors, Pressure-Gauges, Street Lamps, and Pillars, &c.
Telegraphic Address: "Braddock, Oldham."

JOHN RILEY & SONS, Chemical Manu-facturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

WANTED, by a Suburban Gas Com-pany, a thoroughly competent MAN as SERVICE LAYER, &c. Must be used to testing Mains, and able to read Indices of Meters, and attend to general Outdoor Work. Teetotaler preferred.
Apply by letter, to No. 1809, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, Four small Purifiers, 5 or 6 feet square, with Connections and Centre-Valve.
State particulars and price, by letter, to No. 1805, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, lowest price for 100 tons of PITCH COKES (for delivery within the next Three months), delivered to the Railway Station, West Bromwich.
Address No. 1807, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Stourbridge Gas Company have FOR SALE a quantity of RETORT MOUTHPIECES, ASCENSION-PIPES, H-PIPES, HYDRAULIC MAINS, and VALVES. May be bought cheap.
For particulars apply to the MANAGER.

FOR SALE—One 8-horse power Engine and COAL BREAKER, with top and bottom Elevator, Gear, and Patent Wrought-Iron Chain, with Malleable Iron Buckets complete.
The above Machinery is almost new, having only been in use about Three months.
For further particulars, apply to the COAL DISTILLATION COMPANY—COOPER'S PATENTS—LIMITED, 322 and 323, Winchester House, Old Broad Street, LONDON, E.C.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application. Spent Oxide and Sulphate of Ammonia purchased.
120 and 121, NEWGATE STREET, LONDON, E.C.

TUBES.

FOR Gas, Steam, and Water; Galvanized, White Enamelled, and Hydraulic Tubes, &c.
JOHN SPENCER, Globe Tube Works, WEDNESBURY, and 14, Great St. Thomas Apostle, LONDON.

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID for making SULPHATE OF AMMONIA of high quality and colour. *Delivery in Railway Tank-Wagons or Carboys.*
Highest References and all particulars supplied on application.

HUTCHINSON BROTHERS, Barnsley, Gas Engineers and Contractors, Makers of Wet and Dry Gas-Meters and General Gas Apparatus, Sulphate of Ammonia Plant, Lead Saturators, Tanks, &c., Tools and Sundries.

GAS Authorities requiring Second-hand GAS APPARATUS—Mouthpieces, Hydraulic Mains, Condensers, Purifiers, Exhausters, Station Meters, &c.—also superior quality Gas-Purifying BOG ORE (OXIDE OF IRON), please address, D. M. NELSON AND SONS, GLASGOW. (Telegraphic Address: "GAS GLASGOW.")

EXTRACT from the Harrogate Gas Company's Report, dated the 5th of February, 1890: Coal consumed, 8600 tons. Gas made, 92,880,000 feet; ditto sold, 84,880,000 feet; ditto unaccounted for, 8,000,000 feet; quantity made per ton, 10,800 feet; ditto sold, 9869 feet. Illuminating Power, 16·1 candles. Coals used, Brancepeth. Owners, Strakers and Love, Newcastle-on-Tyne; who have also Brandon Hutton Seam Unscreened Gas Coal. Analysis, 10,500 cubic feet per ton; Illuminating Power, 16·2 candles.

FOR SALE—Single Gasholder, 60 feet diameter by 23 feet deep. Capacity, 65,000 cubic feet; fixed complete; in good condition.
Also one Single GASHOLDER, 80 feet by 20 feet deep, ten Cast-Iron Columns and Wrought-Iron Girders.
Also four PURIFIERS in a group, 16 ft. by 12 ft. by 3 ft. 9 in. deep; 12-inch Centre-Valve and Connections.
Would erect the above, and make practically equal to new.
Inquiries invited for various second-hand Gas Plant—Gasholders, Tanks, Purifiers, Washers, Exhausters, Station Meters, &c.
Apply to SAML. WHILE (late Ashmore and While), 60, Queen Victoria Street, LONDON, E.C.

THE Wollaston Gas Company invite TENDERS for the supply of from 250 to 300 tons of best GAS COAL, to be delivered free at the London and North-Western Railway Station, Wellingborough, from May, 1890, to July 1, 1891.
Tenders to be delivered, by the 1st of May next, to THOMAS ARCHER, Secretary.
55, Oxford Street, Wellingborough.

TENDERS FOR GAS COAL.

THE Directors of the Burgess Hill Gas Company, Limited, invite TENDERS for the supply of 200 tons, colliery weight, of THORNCLIFFE, SILKSTONE, PELAW MAIN, WALLSEND, EAST PONTOP, or other GAS COALS, of equal quality; to be delivered free to Burgess Hill Station during the present month.

Tenders to be sent to the undersigned on or before the 19th inst.

The Directors do not bind themselves to accept the lowest or any tender.

S. H. NORMAN, Secretary *pro tem.*

Burgess Hill, Sussex, April 12, 1890.

TENDERS FOR CAST-IRON MAINS.

THE Wellingborough Gaslight Company, Limited, invite TENDERS for the supply of about 7300 yards of 6-inch, 1460 yards of 4-inch, and 1800 yards of 3-inch turned and bored coated PIPES, and various SPECIALS.

Forms of tender and full particulars can be had on application.

Sealed tenders to be delivered to the undersigned, on or before April 28, 1890, endorsed "Tenders for Pipes."

The Company do not bind themselves to accept the lowest or any tender.

S. H. KIMBELL, Secretary.

STEAM TUBES AND FITTINGS.

THE Gas Committee of the Corporation of Lincoln are prepared to receive TENDERS for the supply of Wrought-Iron TUBES and FITTINGS, for the year ending Dec. 31, 1890.

Quantities and other particulars may be obtained on application to the Manager, Mr. John Carter.

The Gas Committee do not bind themselves to accept the lowest or any tender.

Tenders, endorsed "Steam Tubes, &c." and addressed to the Chairman of the Gas Committee, Gas Offices, Lincoln, must be sent in not later than the 26th inst.

H. K. HEBB,
Clerk of the Urban Sanitary Authority and Deputy Town Clerk.

TENDERS FOR GAS COAL.

THE Corporation of Droitwich invite TENDERS for the supply of 500 to 1000 tons of best screened GAS COAL at per ton of 21 cwt., to be delivered free at Droitwich (G. W.) Railway Station at such times and in such quantities as may be required.

The Contract will be for One year, commencing on the 1st prox.

Tenders (with analysis of the Coal to be supplied), properly endorsed "Tender for Gas Coal," to be sent to the undersigned on or before the 30th inst.

The Corporation do not bind themselves to accept the lowest or any tender.

S. JOHN TOMBS, Town Clerk.

Droitwich April 12, 1890.

BELPER GAS AND COKE COMPANY.

TENDERS FOR COAL AND COKE.

THE Directors are prepared to receive TENDERS for the supply at their Works, situate near the Railway Station, Belper, of 2000 tons, more or less, of GAS COAL (part in the Gas Company's own Wagons), also about 200 tons, more or less, of CANNEL COAL; to be delivered at such times, and in such quantities, as the Directors or their authorized Servants shall from time to time order.

Sealed tenders, stating price per ton of 21 cwt., and information as to the quality and quantity of Gas the Coal is estimated to produce, also as to where the same is now in use, to be sent to the undersigned, on or before Friday, the 25th of April.

The Directors do not bind themselves to accept the lowest or any tender, nor to take the whole of the above quantities of Coal or Cannel.

By order,
JOSEPH PYM,
Managing Director.

Belper, April 10, 1890.

SHANKLIN GAS COMPANY, LIMITED.

THE Directors of the above Company invite TENDERS for the supply of 1000 tons, more or less, of best screened GAS COAL, delivered free at the Company's Siding of the Isle of Wight Railway, in such monthly quantities as may be required for the period of One year, commencing the 1st of June next.

Tenders are to state the names of the Pits from which the Coal will be supplied.

The Coal shall be fresh wrought, and free from Slate, Pyrites, and Impurities, and to the entire satisfaction of the Company's Manager.

Tenders to be received on or before the 1st day of May next, addressed to the Chairman, Gas Office, Shanklin, Isle of Wight, and endorsed "Tender for Gas Coal."

By order,
W. SUTHERLAND, Secretary.

Gas Offices, Shanklin, Isle of Wight,
April 3, 1890.

SUTTON-IN-ASHFIELD LOCAL BOARD.
(GAS DEPARTMENT.)

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee of the Sutton-in-Ashfield Local Board are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR produced at their Works during the ensuing year.

Particulars may be obtained on application to the Manager at the Gas-Works, Sutton-in-Ashfield, Notts.

Tenders, stating price per ton of 20 cwts. at the Works, or at Sutton-in-Ashfield Railway Station, to be addressed to the Clerk to the Local Board, Local Board Offices, Sutton in-Ashfield, and marked "Tender for Tar and Liquor," so as to arrive not later than Tuesday, the 29th of April, 1890.

By order,
G. H. HIBBERT,
Clerk to the Committee.

Local Board Offices, Sutton-in-Ashfield, Notts.

SUTTON-IN-ASHFIELD LOCAL BOARD.
(GAS DEPARTMENT.)

SUPPLY OF GAS COAL.

THE Gas Committee of the above Local Board are prepared to receive TENDERS for the supply of 2300 tons of well-screened GAS COAL, to be free from Shale and Pyrites, and to be delivered at the Railway Station, Sutton, in such quantities as the Manager shall from time to time direct, between July 1, 1890, and June 30, 1891.

Particulars may be obtained on application to the Manager at the Gas-Works, Sutton-in-Ashfield, Notts.

Tenders, stating price, to be addressed as above, and marked "Tender for Coal," so as to arrive not later than Tuesday, the 29th of April, 1890.

By order,
G. H. HIBBERT,
Clerk to the Committee.

Local Board Offices, Sutton-in-Ashfield, Notts.

SUTTON-IN-ASHFIELD LOCAL BOARD.
(WATER DEPARTMENT.)

SUPPLY OF COAL.

THE Water Committee of the above Local Board are prepared to receive TENDERS for the supply of 250 tons of Best Hard COAL SCREENINGS; to be delivered at Mansfield Railway Station, in such quantities as the Manager shall from time to time direct, between July 1, 1890, and June 30, 1891.

Particulars may be obtained on application to the Manager at the Gas-Works, Sutton-in-Ashfield, Notts.

Tenders, stating price, to be addressed to the Clerk to the Local Board, Local Board Offices, Sutton-in-Ashfield, and marked "Tender for Coal Screenings," so as to arrive not later than Tuesday, the 29th of April, 1890.

By order,
G. H. HIBBERT,
Clerk to the Committee.

Local Board Offices, Sutton-in-Ashfield.

TO PIPE-FOUNDERS.

THE Directors of the Clayton, Allerton, and Thornton Gas Company are prepared to receive TENDERS for the supply of about 1300 yards of 8-inch plain SOCKET PIPES in 9-feet lengths, and 1300 yards of 18-inch plain SOCKET PIPES in 12-feet lengths; also SPECIAL CASTINGS.

Particulars and specifications from the undersigned.

Tenders to be sent in to the Chairman on or before Monday, the 28th day of April, 1890.

JOHN NIVEN, Engineer and Manager.

Gas-Works, Clayton, near Bradford,
Yorks., April 8, 1890.

BRISTOL UNITED GASLIGHT COMPANY.

TENDERS FOR GAS COAL AND CANNEL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of their requirements (say, 150,000 tons) of GAS COAL during a period of One year, commencing the 1st of July next.

Particulars and forms of tender may be obtained on application to the undersigned, to whom also tenders, sealed and endorsed "Tender for Coal," must be delivered not later than Ten a.m., on Monday, the 19th day of May next.

JAS. V. GREEN, Secretary.

Gaslight Offices, Canons' Marsh,
Bristol, April 9, 1890.

LIVERPOOL UNITED GASLIGHT COMPANY.

THE Directors of the Liverpool United Gaslight Company are prepared to receive TENDERS for the supply of 40,000 tons of CANNEL and 160,000 tons of COAL, to be delivered at the various Works of the Company, during the period of Twelve months, between the 1st of July, 1890, and the 30th of June, 1891.

Tenders will be received for the whole or any portion of the above quantity.

The Directors reserve the right to accept tenders for the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any tender.

Full particulars and printed forms of tender can be obtained on application to the undersigned, at the Gas Office, Duke Street, Liverpool, to whom tenders (on the printed form) must be sent on or before Monday, May 5, 1890, endorsed "Tender for Coal."

By order,
WILLIAM KING, Engineer.

Gas Office, Duke Street, Liverpool,
April 12, 1890.

TO CHEMICAL MANUFACTURERS & OTHERS.

TENDER FOR TAR AND LIQUOR.

THE Directors of the Gravesend and Milton Gaslight Company are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR of the Company from the 25th of June, 1890.

The contract will terminate on the 24th of June, 1891, or the 24th of June, 1893, at the option of the Directors.

The Purchaser will be required to sign a Contract, a copy of which can be seen at my Offices.

The Tar and Liquor will be delivered free into the Purchaser's Barges alongside the Company's Works, which abut on the Thames and Medway Canal.

The Purchaser must pay Canal Dues.

Tenders must quote for Tar at per gallon, and for Liquor at per ounce of strength per butt of 108 gallons.

Twaddel's test (at 60° Fahr.) will be observed.

The Directors do not guarantee any specific quantity of Tar or Liquor; but there will probably be about from 80,000 to 100,000 gallons of Tar.

Tenders, marked outside "Tenders for Tar and Liquor," sealed, and addressed to me as below, must reach me not later than Tuesday, April 29 next.

The Directors do not bind themselves to accept the highest or any tender.

By order,
CHAS. R. GRAMSHAW, Secretary.

27, King Street, Gravesend.

C. & W. WALKER.

GASHOLDERS; PURIFIERS; PURIFYING MACHINES;

CO_2 AND TAR-EXTRACTING WASHERS; SCRUBBERS;

SULPHATE & SULPHUR PLANT;

RETORT MOUTHPIECES; CONDENSERS;

LIFTING APPARATUS; CENTRE AND FOUR-WAY VALVES;

SLIDE VALVES; TAR BURNERS; &C. &C.

WOOD SIEVES.

ADDRESSES: 8, Finsbury Circus, London, E.C.; Midland Iron-Works, Donnington, near Newport, Shropshire.

"FORTRESS LONDON." "FORTRESS DONNINGTON."—Telegraphic.

TENDERS FOR GAS COAL, ETC.

THE Directors of the Preston Gas Company invite TENDERS for their supplies of COAL and CANNEL for a period of One, Three, or Five years.

Particulars may be obtained from the undersigned.

Sealed tenders, endorsed "Tender for Coal," and addressed to the Chairman of the Company, must be delivered on or before Wednesday, the 30th inst.

HENRY GREEN, Engineer.

April 10, 1890.

TENDERS FOR TAR AND LIQUOR.

THE Directors of the Victoria New-market Gaslight and Coke Company, Limited, are prepared to receive TENDERS for the surplus TAR and LIQUOR made at their Works during the ensuing Twelve months, ending March 25, 1891.

Tenders, stating price per 1000 gallons delivered free on Rails at Newmarket Station, to be sent to the undersigned on or before the 18th day of April, 1890.

The Directors do not bind themselves to accept the highest or any tender.

By order,
THOMAS WILKINSON,
Manager and Secretary.

Gas-Works, Newmarket, April 2, 1890.

HONITON GAS-WORKS.

THE Directors of the Honiton Gas and Coke Company, Limited, invite TENDERS for the Erection of a GASHOLDER complete, including Brick Tank and all Connections, at their Works as above.

Capacity, not less than 22,000 cubic feet.

Plans may be seen, and every information obtained, at the Works, or copy of plan and specification of the Holder may be had upon application to the Engineer, upon payment of £1 1s.

Sealed tenders to be addressed to the Secretary on or before the 23rd of April, 1890.

The lowest or any tender not necessarily accepted.

March 29, 1890.

COAL AND CANNEL.

THE Lymm Local Board are prepared to receive TENDERS for the supply of COAL and CANNEL, to be delivered at their Gas-Works in Lymm, for a term of One year, from the 1st day of July, 1890.

The probable quantities required are about 950 tons of Coal and 150 tons of Cannel; but the Board reserve the right of increasing or decreasing the quantities named.

The person whose tender is accepted will be required to enter into a contract, form of which can be seen at the Board's Office any Tuesday or Friday, between the hours of Ten and Twelve a.m., and Two and Five p.m.

The tenders, stating price per ton delivered alongside the Works, to be sent to the undersigned, on or before the 26th day of April, 1890, endorsed "Coal and Cannel."

Further particulars can be had of Mr. A. Graham, Gas-Works Manager.

The Board do not bind themselves to accept the lowest or any tender.

W. MULLARD,
Clerk to the Board.

Local Board Offices, Lymm,
April 9, 1890.

TAR AND AMMONIACAL LIQUOR.

THE Lymm Local Board are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR made at their Gas-Works for a term of One year, from the 1st day of July, 1890 (or for such longer term as may be contracted for, with the consent of the Board).

The Tar and Liquor will be delivered free in Contractor's Boat on the Bridgewater Canal.

Tenders to be sent to the undersigned on or before the 26th day of April, 1890, endorsed "Tar."

The purchaser will have to enter into a contract, form of which can be seen at the Board's Office any Tuesday or Friday, between the hours of Ten and Twelve a.m., and Two and Five p.m.

The Board do not bind themselves to accept the highest or any tender.

Further particulars to be had of Mr. A. Graham, Gas-Works Manager.

W. MULLARD,
Clerk to the Board.

Local Board Offices, Lymm,
April 9, 1890.

GLASGOW CORPORATION GAS.

THE Glasgow Corporation Gas Com-missioners invite TENDERS for the supply of such METERS (Dry and Wet) as they may require for Twelve months from the 1st of May, 1890.

Forms of tender may be had on application to the Manager, at the Gas Office, 45, John Street, Glasgow.

Sealed Offers, marked "Tender for Meters," to be addressed to, and lodged with, the Subscriber on or before Tuesday, the 22nd current.

The Commissioners do not bind themselves to accept the lowest or any tender.

J. D. MARWICK, Town Clerk.

City Chambers, George Square,
Glasgow, April 1, 1890.

FARNHAM GAS COMPANY, LIMITED.

THE Directors of the Farnham Gas Com-pany, Limited, are prepared to receive TENDERS from Persons willing to supply and deliver, free of all Dues and Charges, at the Farnham Station, London and South-Western Railway, 1600 tons of one of the following descriptions of GAS COAL—viz., New Pelton, Pelaw Main, Aldwarke Main, or Staffordj Silkstone—700 tons, to be delivered in quantities of 50 tons (at intervals of Seven days), before the 20th day of August next; 900 tons, to be delivered in quantities of 50 tons (at intervals of Seven days), between the 1st of October next and the 7th of February, 1891.

The Coals to be consigned to the order of the Farnham Gas Company, Limited, at the Farnham Railway Station.

In the case of Seaborne Coal, the Meter's Certificate of each quantity to be duly sent with Invoice of same.

Payment, monthly at the ordinary meeting of Directors.

Sealed tenders, marked "Tender for Coal," to be delivered to the Secretary, W. Wells, 112, West Street, Farnham, Surrey, not later than Eleven o'clock a.m., on Monday, the 5th of May, of whom forms of tender may be obtained.

The Directors reserve the right to reject the lowest or any tender.

April 9, 1890.

IMPERIAL CONTINENTAL GAS ASSOCIATION.
INCORPORATED BY ACT OF PARLIAMENT.

NOTICE is hereby given that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Association will be held at the City Terminus Hotel, Cannon Street, London, E.C., on Tuesday, the 6th day of May next, at 2.30 p.m. precisely, when a Report will be made to the Proprietors, a Dividend declared for the Half Year ended the 31st of December last, and the usual Ordinary Business of such Meeting transacted.

NOTICE IS HEREBY ALSO GIVEN that the Transfer Books will be closed from the 22nd inst. to the 6th of May next, both days inclusive.

By order of the Board,
R. S. GARDINER, Secretary.

30, Clement's Lane, Lombard Street,
London, E.C., April 14, 1890.

Now Ready, Price 6s., Cloth Bound, Bevelled Boards,

THE

GUIDE-FRAMING OF GASHOLDERS

AND OTHER PAPERS

CHIEFLY RELATING TO

STRAINS IN STRUCTURES CONNECTED WITH GAS-WORKS.

BY

F. SOUTHWELL CRIPPS, Assoc. M. Inst. C.E.

Reprinted from the JOURNAL OF GAS LIGHTING, *&c. Fully Revised and Corrected by the Author, with many Additions.*

LONDON:
WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

Price 2s. per dozen, or 10s 6d. per 100, post free.

CONSPIRACY and Protection of Pro-perty Act. It is required, under a Penalty of FIVE POUNDS, that a Printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat.

Printed copies of this Section, in large type, on broad sheets, may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

*** *The Act extends to Scotland and Ireland.*

SEVENTH YEAR. Now Ready (Demy 8vo., Price 5s. 6d. post free),

THE COMPLETE REPORTS

OF THE

PROCEEDINGS

OF THE VARIOUS

DISTRICT ASSOCIATIONS OF GAS MANAGERS for 1889,

Forming a Companion Volume to the Transactions of The Gas Institute, with which it is uniform in size.

*** **THE VOLUMES for 1883 to 1888 ARE STILL ON SALE.**

LONDON:

WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

Now Ready, Fcap. 4to, Cloth, Gilt Lettered, with numerous Illustrations, price 7s. 6d., post free.

Practical Photometry:

A GUIDE TO THE STUDY OF THE

MEASUREMENT OF LIGHT.

By William Joseph Dibdin, F.I.C., F.C.S.,

Member of the Society of Public Analysts and of the Committee of the London Section of the Society of Chemical Industry.

Chemist and Superintending Gas Examiner to the London County Council.

The aim of the Author has been to give a comprehensive account of the various methods of Photometry in daily use, and to make the book thoroughly practical by indicating the many precautions necessary for ensuring accurate results in photometrical work. The volume contains chapters on the History and Principles of Photometry; Horizontal, Radial, and Jet Photometers; Standards of Light; the Proposed Substitute for Candles; the Auxiliary Apparatus required in Testing Gas; the Examination and Adjustment of a Gas-Testing Photometer; and Colour and Stellar Photometry; together with an Appendix comprising the Notification of the Metropolitan Gas Referees, Tables for the Correction of Volume of Gas and Observations of Candles, and other matter useful to Photometrists.

London: WALTER KING, 11, Bolt Court, FLEET ST., E.C.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on application.

Is now Ready, the Fifth Edition of the

HANDBOOK

FOR

Gas Engineers and Managers.

BY

THOMAS NEWBIGGING,

Member of the Institution of Civil Engineers.

PRICE: MOROCCO, GILT, 18s.; CLOTH, 15s.; DELIVERED FREE.

LONDON:

WALTER KING, "JOURNAL OF GAS LIGHTING," ETC., 11, BOLT COURT, FLEET STREET, E.C.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their Inventions may be secured for Twelve months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

PATENTS FOR INVENTIONS,
REGISTRATION OF TRADE MARKS and DESIGNS in all Countries.

SEARCHES made *re* novelty, and opinions given on all matters connected with above. *Full particulars on application to*

J. C. CHAPMAN,
Assoc.M.Inst.C.E., M.Inst.M.E., Fel. Inst. Patent Agents,
70, CHANCERY LANE, LONDON, W.C.

Special experience in Gas and Ammonia Plant.

For FIRE-BRICKS, the most durable for GAS-FURNACES,
ADDRESS
JAMES WHITE & Co.,
ALBERT WORKS, WIDNES.

COKE BREAKERS,
FROM £14 EACH.
(THOMAS & SOMERVILLE'S PATENT.)

New Design, with two Cutting Rollers, making less Breeze than their old pattern.

GEORGE WALLER & CO.,
PARK STREET, SOUTHWARK, E.C.

ROBERT HOLSWORTH,
103, BOSTON STREET,
HACKNEY ROAD, LONDON, N.E.
Telegraphic Address: "HOLSWORTH LONDON,"
MANUFACTURER OF
FLAT and ROUND HEMP and MANILLA ROPES, LINES, SCAFFOLD CORDS, SPUN YARNS, GASKETS, and TWINES of every description; COAL, COKE, and CORN SACKS, TARPAULINS and WATERPROOF COVERS, MATS, and MATTING.

CONTRACTS TAKEN.

ESTABLISHED, 1831.

NEWBATTLE CANNEL.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

THE ONLY RELIABLE
DRY CENTRE-VALVE.

WORKING ONE, TWO, THREE, OR FOUR PURIFIERS ON AT THE TIME.

ALSO MADE FOR TWO OR THREE PURIFIERS.

No Springing. No Leakage. No Foul Gas passed in Changing. Special Facility for Blowing the Air out of the Fresh Box before putting in Action, without driving it forward into the Holders.

Write for Prospectus.

ALSO DOUBLE-ACTION DOUBLE-FACED GAS & WATER VALVES.

F. WECK, 86, NEW STREET, BIRMINGHAM.

Newland Gas Coal

For particulars, apply to

LOCKE & CO.,
NORMANTON,
YORKSHIRE.

GAS COAL.

POPE & PEARSON, LTD.,

have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles; or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12¼ cwt. of good coke.

This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

HEBBURN MAIN GAS COALS.

Produce of Gas per ton	10,500 feet.
Coke "	13½ cwt.
Illuminating Power "	16 candles.

For Prices, f. o. b. Ship or delivered, apply to
W. RICHARDSON,
Hebburn Colliery Offices, NEWCASTLE-on TYNE.

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
MIRFIELD, NORMANTON.

CAST-IRON PIPES
FOR GAS AND WATER.
VALVES
FOR GAS, WATER, AND STEAM.

TELEGRAMS: "PIPES GLASGOW."
WM. MACLEOD & CO.,
56, ROBERTSON STREET, GLASGOW.

Lanemark Coal Co.,
LIMITED.

LANEMARK CANNEL
AND GAS COALS.

Quotations and Analysis on application to

LANEMARK COLLIERY,
NEW CUMNOCK, N.B.

Shipping Ports: All the principal Scotch Ports.

FOR PAINTING GASHOLDERS, PIPES, IRON BUILDINGS, SHEDS, BRIDGES, COLUMNS, &c., &c.

THE BEST POSSIBLE PRESERVATIVE FOR IRONWORK.

RED OXIDE OF IRON.

INQUIRIES SOLICITED.

Large Consumers supplied ON MORE FAVOURABLE TERMS than can be obtained from any other Manufacturer.

ADOLPHE CROSBIE, Walsall Street Chemical Works, WOLVERHAMPTON.

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE, FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS. Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
Shipments Promptly and Carefully Executed.

THOMAS ILLINGWORTH,
NORTH DEAN CHEMICAL WORKS,
Near HALIFAX,
MANUFACTURER OF SULPHURIC ACID
OF EXTRA QUALITY FOR MAKING
WHITE SULPHATE OF AMMONIA.

TAR, LIQUOR, AND SPENT OXIDE
Purchased for Cash against Delivery.

GAS AND WATER PIPES.
1¼ to 12 in. BORE.

THOMAS ALLAN & SONS,
Bon Lea Foundry,
SOUTH STOCKTON-ON-TEES.

Also Manufacturers of
SANITARY & RAIN-WATER PIPES, HOT WATER PIPES, STABLE FITTINGS, RANGES, STOVES, And GENERAL CASTINGS.
Glasgow Office: 24, George Square.
Telegrams:
"Bonlea, Stockton-on-Tees."
Springbank Glasgow."

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for
CANNEL & COAL.

TYNE
BOGHEAD ✣ CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP ✣ GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	70 per cent.

For Prices and complete Analysis, apply to
YOUNG, DANCE, & CO.
Coal Owners, Newcastle-on-Tyne,
Or E. FOSTER & CO. 21, John St., Adelphi, LONDON, W.C.

JAMES OAKES & Co.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter; and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

Note. — Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts, and covers, and rendering leakage impossible.

THOMAS TURTON AND SONS, Limited,
Sheaf & Spring Works,
SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
London Office:
90, CANNON STREET, E.C.

The GRANTHAM CRANK & IRON Co., Ld.,
GRANTHAM.
Manufacturers of
VERTICAL,
PORTABLE,
CORNISH,
AND
LANCASHIRE
BOILERS.
Send for List 16G.
Liberal Terms
TO
Shippers and the Trade.

THE ÉTOILE GAS-LAMP COMPANY,
Gas Lighting and Ventilating Engineers, Brass and Iron Founders, and General Metal Spinners.
124 and 126, PRINCESS STREET, MANCHESTER.
PRICE LIST ON APPLICATION.

ROOTS' PATENT "ACME"

GAS EXHAUSTERS.

POSITIVE IN ACTION. SIMPLE IN CONSTRUCTION. DURABLE & SOLID IN DESIGN.

All Working Parts external and unaffected by Gas.

SOLE LICENSEES under Roots' Latest Patents,

SAMUELSON & CO., LTD., BANBURY, OXON.

STREET-LAMPS,

ORDINARY OR

OUR SPECIAL HIGH-POWER.

The best Lamps in the Trade.

Street-Lamp Governors. Gas-Meters.

HULETT'S

SERVICE CLEANSER.

No Gas Company should be without this Apparatus.

THOUSANDS IN USE.

Every Description of Gas-Fittings, Pressure-Gauges, &c.

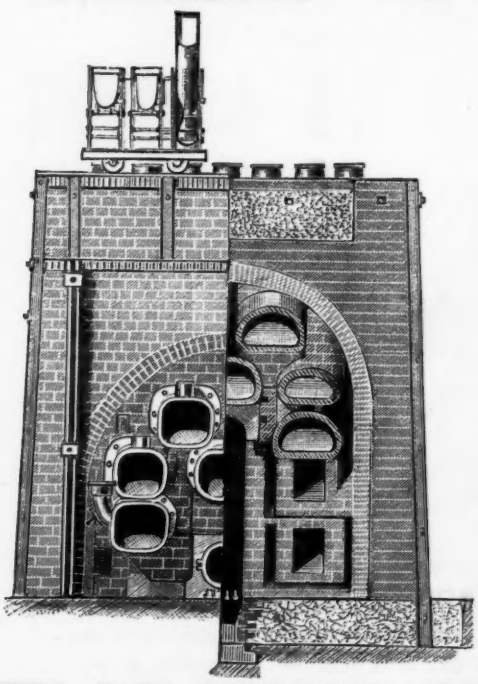
D. HULETT & CO., LIMITED.

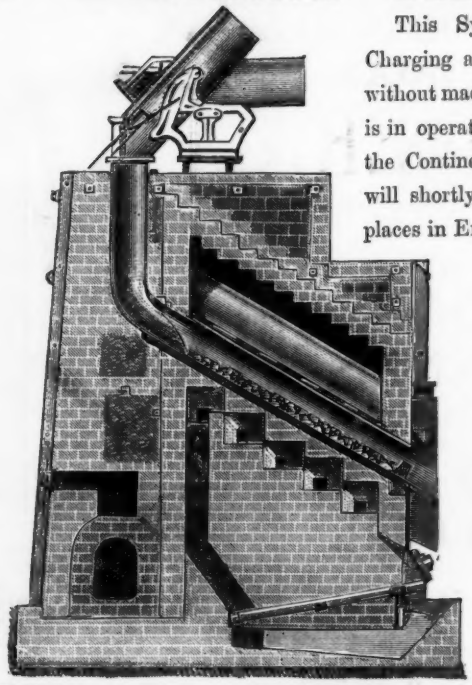
55 & 56, HIGH HOLBORN, LONDON.

COZE'S AUTOMATIC SYSTEM

OF

CHARGING AND DRAWING RETORTS.





This System of Automatically Charging and Discharging Retorts, without machinery or arduous labour, is in operation at several places on the Continent and in America, and will shortly be at work in various places in England.

All information as to advantages, cost, royalties, &c., can be obtained from the undersigned.

The System is fully patented, and any infringer will be strictly proceeded against.

GOLD MEDAL,
Paris Exhibition, 1889.

THE COZE SYNDICATE, LIMITED, 86-88A, LEADENHALL STREET, E.C.

JAMES D. PERKINS. F. SEAVERNS.

PERKINS & Co.,

228 & 229, PRODUCE EXCHANGE, NEW YORK.

Cable Address: "PERKINS, NEW YORK." *Post Office Box 3695, New York.*

SOLE AGENTS FOR THE CELEBRATED

BRECKENRIDGE CANNEL

AND THE

OLD KENTUCKY BOGHEAD

OF KENTUCKY, U.S.A.

These Cannels will rank with the Australian Shale for Gas Manufacture.

Also General Sales Agents for

PENNSYLVANIA & VIRGINIA GAS COALS, & AMERICAN FOUNDRY & FURNACE COKE.

Delivery Prices made to any Port in

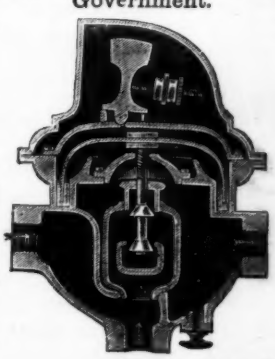
GREAT BRITAIN, ON THE CONTINENT, OR SOUTH AMERICA.

Full Information furnished upon Application to the above Address.

THE WENHAM AUTOMATIC GAS GOVERNOR

As supplied to and approved of by H.M. Government.

The most reliable Automatic Method of economizing Gas without reducing the Illuminating Power.



HUNDREDS ALREADY FIXED.

FLOOR WARMING STOVES

(LEEDS' PATENT).

CAN BE SUPPLIED FOR EITHER GAS OR OIL.

THESE STOVES ARE

CLEANLY, PORTABLE, ECONOMICAL,

And applicable for all kinds of Rooms where a Comfortable and Wholesome Atmosphere is desired.

For Prices and further Particulars, apply to the Manufacturers,

THE WENHAM COMPANY, LTD.,

UPPER OGLE STREET, FITZROY SQUARE, LONDON, W.

MANCHESTER: 5, Deansgate. BIRMINGHAM: 121, Corporation Street.

RUSCOE'S PATENT MACHINE

FOR DRILLING AND TAPPING WATER-MAINS AND GAS-MAINS UNDER PRESSURE.

Patent Saddle Back and Drilling Apparatus, whereby Gas and Water Mains can have 2-in. 3-in., 4-in., 5-in., and 6-in. Branches put on without loss of Water or Gas.

Sole Maker of HELPS' PATENT PIPE EXTRACTOR.

Prices and Particulars on Application to

JOHN RUSCOE, Albion Works, Hyde, near Manchester.

SIXTY PER CENT. ECONOMY IN GAS LIGHTING.

THE SCHÜLKE REGENERATIVE LAMP

FOR DOMESTIC AND EXTERNAL LIGHTING

The only Generative Lamp employing the common flat-flame burners.

Lamps giving 20-Candle Power consume less than 4-feet of Gas per hour.

A PURE WHITE AND PERFECTLY STEADY LIGHT NOT AFFECTED BY DRAUGHTS.

Suitable for any existing fittings (brackets or suspending). Can be fixed in a few minutes

May be seen at the Offices of the

SCHÜLKE GAS-LAMP COMPANY, LTD.,

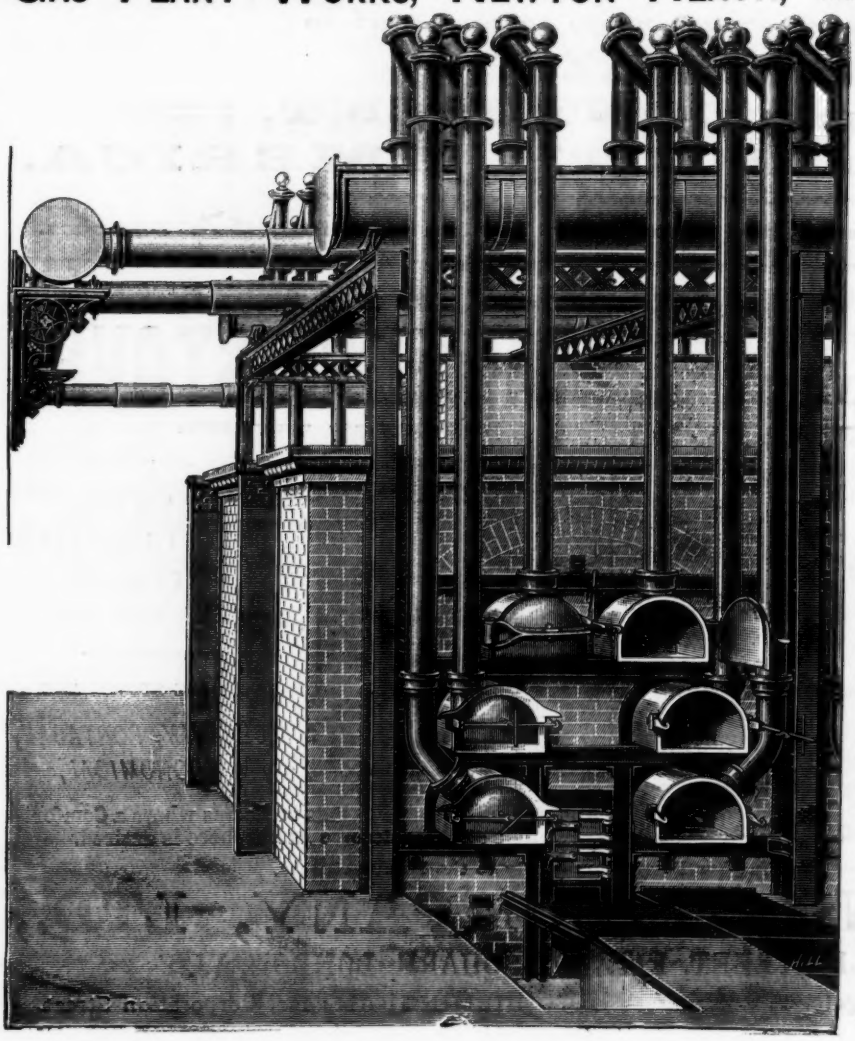
ROOM 446—11, QUEEN VICTORIA ST., LONDON, E.C.,

WHERE PRICE LISTS AND FULL PARTICULARS MAY BE OBTAINED.

R. & J. DEMPSTER,

Engineers, Ironfounders, and Contractors,

GAS PLANT WORKS, NEWTON HEATH, MANCHESTER.



RETORT-BENCH

SHOWING APPLICATION OF

MESSRS. R. & J. DEMPSTER'S

PATENT

Regenerative Furnace

TO A

BED OF SIX RETORTS.

These Furnaces are very economical in the consumption of Fuel and in the wear and tear of Retorts, and require a minimum of Excavation.

Retort-Benches erected complete, with or without Regenerative Furnaces, and with Brick, Clay, or Iron Retorts.

Mouthpieces with self-sealing Lids.

Stamped Retort-Lids, in Iron or Steel.

Arms, Cross-Bars, and Screws.

Patent Wrought-Iron Ascension-Pipes.

Furnace Frames and Arch-Pipes in great variety.

Hydraulic Mains of all sections.

Hydraulic Main Regulating Valves.

Wrought-Iron Foul Mains.

Wrought or Cast Iron Brick Stays.

Steel Charging Scoops.

Sight Plugs in great variety of Designs and Sizes.

WATER GAS FUEL GAS

FOR INDUSTRIAL PURPOSES

GENERATED FROM

BITUMINOUS SLACK COAL

BY THE

LOOMIS PROCESS.

The Cheapest Gas-Generating System in the World.

NOVEL IN DESIGN.
MODERN IN CONSTRUCTION.
SIMPLE IN OPERATION.
PERFECT IN RESULTS.

PROCESS AND APPARATUS PATENTED IN ALL COUNTRIES.

By this system more gas, and of a higher heating power per cubic foot, can be generated from a ton of Bituminous Slack Coal than by any other from a ton of Anthracite Coal or Coke.

The successful application of Water Gas for industrial purposes was brought about through this Process at the Works of the—

JOHN RUSSELL CUTLERY COMPANY, Turner's Falls, Mass., where it has been in daily use upwards of two years, doing all the Forging, Hardening, and Tempering.
HENRY DISSTON & SONS, Steel, Saw, and File Works, Philadelphia.
AMERICAN WALTHAM WATCH COMPANY, Waltham, Mass.
ADDYSTON PIPE AND STEEL COMPANY, Cincinnati.

Many other industrial establishments in America are successfully using this Process, and a large number of Works are now being erected, including a plant at Brussels and at Sheffield (at Messrs. Thomas Firth and Sons, Limited).

This process is especially adapted for firing all classes of Pottery, Tile, and Brick Kilns.

For particulars apply to

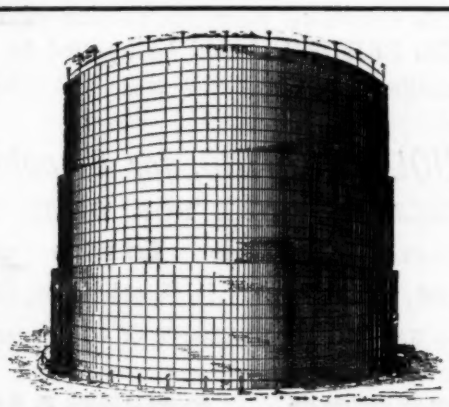
NEWTON, CHAMBERS, & CO., LIMITED,
THORNCLIFFE IRON-WORKS, near SHEFFIELD.

REVOLUTION

IN GASHOLDER CONSTRUCTION.

(GADD & MASON'S PATENTS.)

IMMENSE SAVING IN COST.
NO COLUMNS. NO FRAMING.
NO PIERS ROUND TANK.
GREATER STABILITY.
TILTING IMPOSSIBLE.



In Holders for Export a very large additional saving is effected in Carriage, Freight, Transport, and Insurance; the Weight being reduced nearly 50 PER CENT.

Tank Construction rendered simpler and very much cheaper; the Piers and heavy Base Stones being dispensed with.

Engineers intending to extend their Gas Storeage should not fail to see the Two-Lift Holder erected for the Northwich Gas Company.

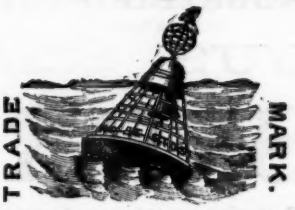
ADMITTED BY EMINENT ENGINEERS TO BE THE SYSTEM OF THE FUTURE.

Telegrams: "SPIRAL MANCHESTER."

THE PATENT GASHOLDER SYNDICATE,

504, STOCKPORT ROAD, MANCHESTER.

BELL'S ASBESTOS AQUOL PAINT



BELL'S ASBESTOS

IS MADE READY FOR USE.

IS FIRE RESISTING.
IS WASHABLE.
IS NON-POISONOUS.
IS MANUFACTURED IN ALL USEFUL COLOURS.
IS IMPERVIOUS TO HEAT, COLD, OR WATER.
IS WITHOUT SMELL.

No expensive Oil or Turpentine required.

WILL NEVER BLISTER.

HAS A COVERING CAPACITY 40 PER CENT. GREATER THAN LEAD PAINTS.

For Outside or Inside Work in any Climate.

Bell's Asbestos Aquol Paint is equally suitable for the finest decorative work as well as for general painting. It can be applied over or under any other paint, and, owing to its easy application, can be used with a large distemper brush; the SAVING THUS EFFECTED IN LABOUR BEING **50** PER CENT. OVER THAT OF LEAD PAINTS.

Bell's Asbestos Aquol Paint is susceptible of the most delicate treatment; and, owing to its perfect flatted surface, it brings up the varnish in a manner that no other paint can equal. ONE COAT OF VARNISH ON **Bell's Asbestos Aquol** IS EQUAL TO TWO COATS ON ORDINARY PAINT.

BELL'S ASBESTOS AQUOL PAINT is specially adapted for Private Houses, Exhibition Buildings, Ships, Churches, Asylums, School Boards, Railway Stations, and all work of Wood, Iron, Cement, Plaster, Stone, Brick, &c., &c.

Those who Study Economy and Protection from Fire should use only

BELL'S ASBESTOS AQUOL PAINT.

BELL'S ASBESTOS AQUOL PRIMING is made Ready for Use.
BELL'S ASBESTOS AQUOL PRIMING stops all suction of Wood, Cement, Plaster, &c.
BELL'S ASBESTOS AQUOL PRIMING should be applied to all New Work.

Suitable for Ceilings, Walls, and New Wood, and is very durable.

BELL'S ASBESTOS AQUOL KNOTTING, for Stopping Knots in New Work.

AN EXCELLENT CURE FOR DAMP WALLS.

Colour Cards and Price Lists on Application.

Supplied in Casks of 5 to 7 cwt., and Iron Drums of 28, 56, and 112 lbs., Sample Tins of 7 and 14 lbs.

Owing to its Covering Capacity, a SAVING IN FREIGHT of 40 per cent. is effected for a given surface.

BELL'S ASBESTOS COMPANY, LIMITED,

SOUTHWARK, LONDON, S.E.

DEPOTS—MANCHESTER: Cable Street, Blackfriars. LIVERPOOL: 2, Strand Street, James Street. HULL: Humber Dock Basin. GLASGOW: 35, Robertson Street. DUBLIN: 2, St. Andrew Street. BERLIN, BARCELONA, and ANTWERP.
AGENTS—BIRMINGHAM: BELL and Co., 7, John Bright Street. CARDIFF: BELL and Co., West Bute Street.

BELL'S ASBESTOS DAGGER PACKING

PATENT No. 15,498.

ROUND

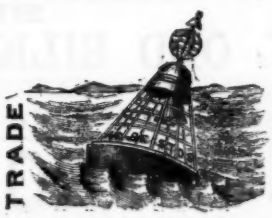
SQUARE. **Every 10 feet has Label as above, and bears our Trade Mark.**

Under this registered title are included the inventions of Mr. Field; and experience has proved them to be the MOST EFFICIENT DURABLE, and ECONOMICAL PACKINGS ever made. They constitute such a combination of Asbestos and India-rubber as secures the maximum of elasticity and heat resistance; and they are, therefore, UNEQUALLED FOR EVERY KIND OF ENGINE. These Packings are being universally used by most of the leading Steamship Companies throughout the world for ordinary Compound, Triple, and Quadruple Expansion Engines of the latest types. The packings are composed of rolled Asbestos Cloth, but the India-rubber is placed in two forms to suit various cases.

IN ORDERING STATE WHETHER SQUARE OR ROUND IS REQUIRED.

BELL'S ASBESTOS CO., Ld.

DEPÔTS.
MANCHESTER: Cable St., Blackfriars.
LIVERPOOL: 2, Strand St., James St.
HULL: Humber Dock Basin.
GLASGOW: 35, Robertson Street.
DUBLIN, BERLIN.



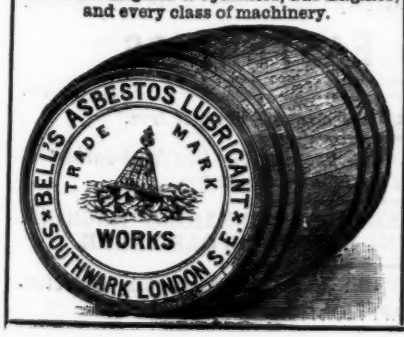
DEPÔTS.
BARCELONA, and ANTWERP.
AGENTS.
BIRMINGHAM: BELL and Co., 7, John Bright Street.
CARDIFF: BELL and Co., West Bute Street.

SOUTHWARK, BELL'S ASBESTOS. LONDON, S.E.

BELL'S ASBESTOS
YARN AND SOAPSTONE PACKING
Is the BEST LOCOMOTIVE PACKING made.

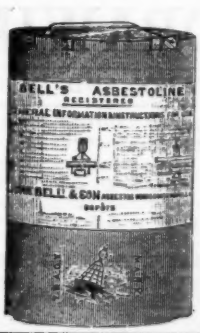
BELL'S
COMPOUND HYDRAULIC PACKING
Is specially suited for Hydraulic Machinery, Accumulators, and Ammonia and all Pumps.

BELL'S ASBESTOS LUBRICANT
Is unequalled For Steam-Engines & Cylinders, Gas-Engines, and every class of machinery.



BELL'S ASBESTOLINE
The reputation of this Lubricant is based on the experience of thousands of users, which places it far in advance of those who rely only on mere laboratory tests.

ASBESTOLINE IS THE CHEAPEST MOST EFFICIENT, CLEANEST MOST INODOROUS AND SAFEST LUBRICANT.

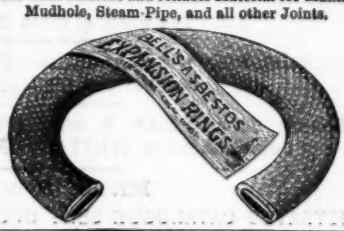


ASBESTOLINE HAS SAVED 90 PER CENT. OVER OIL.

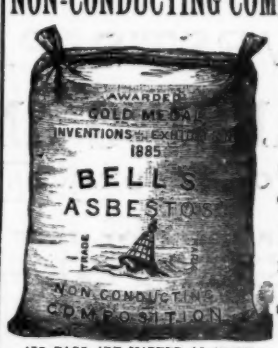
Has been used for all purposes, AND BEATEN ALL OTHER LUBRICANTS IN ACTUAL WORK.

BELL'S ASBESTOS
EXPANSION SHEETING
RINGS, AND TAPE.

Is the most efficient and reliable Material for Manhole, Mudhole, Steam-Pipe, and all other Joints.



BELL'S ASBESTOS
NON-CONDUCTING COMPOSITION.



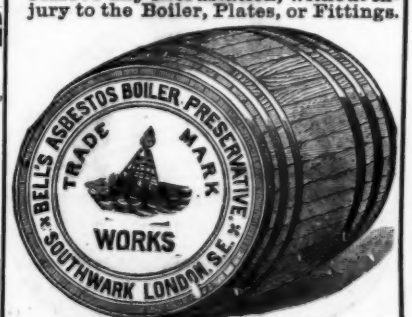
ALL BAGS ARE MARKED AS ABOVE.

Will reduce loss by radiation, and saves 40 per cent. of fuel.

Is suitable for boilers with flat or round bottoms. Is superior to any other, and saves its cost in a few months.

Is sent out dry in bags; therefore cheaper than others sent out wet.

BELL'S ASBESTOS
BOILER PRESERVATIVE
Will effectually keep Boilers clean, and remove any Incrustation, without injury to the Boiler, Plates, or Fittings.



WILLIAM GRICE & CO.

Ironfounders, Gas and General Engineers,

Fazeley Street Works, BIRMINGHAM.

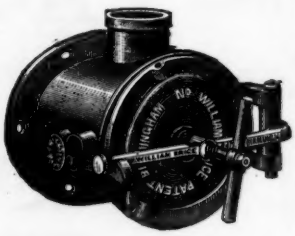
MANUFACTURERS OF

Grice's Patent Self-Sealing Mouthpieces.

To suit all sized sections of Retort. Over 70 stock sizes. Largely used in England.

Grice's Patented Stoking Machinery.

Made to suit large or small Gas-Works. The one machine draws the spent coke and recharges the Retort at one operation. Self-contained; working from engine on base or by hand. Price and particulars on application.



PURIFIERS, TANKS, PIPES, & OTHER PLANT MADE.

Machine-Moulded Spur, Bevel, Mitre, and Helical Wheels and Pulleys, to 20 feet diameter.

WROUGHT-IRON WAREHOUSE CRANES

As supplied to the English Railway Companies.

MORTAR & LOAM MILLS.

With or without Engines.

PUNCHING AND SHEARING MACHINERY

Of all Kinds.

ENGINES, Vertical and Horizontal; High and Low Pressure CONDENSING BOILERS; Tubular and Ordinary CASTINGS. All descriptions up to 15 tons.

JOHN ABBOT & CO., LIMITED.

ESTABLISHED 100 YEARS.

THE LARGEST

SULPHATE PLANT MANUFACTURERS

IN THE TRADE.

The present Low Prices render it absolutely necessary for Gas Engineers to use the commonest Pyrites Acid, and obtain the whitest and best quality of Sulphate, so as to obtain a better price and more ready market.

For this purpose they strongly recommend the

NEW IMPROVEMENTS

Combined with their

PATENT SAFETY CLOSED SATURATORS

Improved Self-acting and Steam Liming Process

Under pressure, effecting a considerable Saving in Time in Working off the Contents of each Still.

— OVER —

30

IN OPERATION.

A number of Plants on the Open System recently remodelled with greatly improved results.

GAS AND WATER PIPES, HYDRAULIC CRANES, CAPSTANS, BOILERS, ROOFS, TANKS, &c.

Messrs. ABBOT & Co. (Works at Gateshead-on-Tyne) employ 2000 men, including several experienced Plumbers, to erect New and remodel Old Sulphate Plants.

Applications to be made to the

LONDON OFFICE,

SUFFOLK HOUSE, CANNON STREET, E.C.

GAS COAL.

BEST

REAL OLD SILKSTONE GAS COAL.

Address, THE STRAFFORD COLLIERIES COMPANY,

Near BARNSLEY, SOUTH YORKSHIRE.

WEST'S GAS IMPROVEMENT Co., Ltd.,

Engineers, Ironfounders, & Contractors,

ALBION IRON-WORKS, MILES PLATTING, MANCHESTER,

MANUFACTURERS OF

WEST'S PATENTED MACHINERY

FOR

CHARGING AND DRAWING GAS-RETORTS.

OVER **160** MACHINES AT WORK AND IN COURSE OF CONSTRUCTION.

Advantages attending its use are:—

INCREASED VOLUME of GAS per TON, and INCREASED YIELD per Retort.—The system of breaking and distributing the coals in an even layer in the retorts effecting more perfect carbonization.

REDUCTION in LABOUR and COST of WORKING.—In Works where this System of charging and drawing Retorts is adopted, there has been effected a substantial saving in the cost of Gas Manufacture in the Retort-House; the amount saved varying in different Gas-Works from **8 PENCE** to **15 PENCE per Ton** of coal carbonized. Full particulars will be forwarded upon application to W. G. I. Company, Limited.

MANUAL CHARGING AND DRAWING MACHINES.

POWER CHARGING AND DRAWING MACHINES, driven by WIRE ROPE, STEAM, or COMPRESSED AIR.—The power machines are applicable to circular, oval, or Ω-shaped retorts and mouthpieces, and are the most perfect, economical, efficient, and durable machines made. They are constructed on principles founded by long and extensive experience in this special branch of gas engineering and the manufacture of gas.

Sole Makers of **Circular, Oval,** or Ω-shaped **Mouthpieces,** with Morton's Self-Sealing Lids fitted with

KING'S PATENT FASTENINGS,

which, by a simple wedging action at each end of the crossbar, secure a very tight joint; and at the same time, by their long sliding motion, they effectually remove the tar or other matter from the surfaces of the mouthpiece and lid.

N.B.—The whole of these Fittings are made of Wrought Iron.

Estimates and further particulars forwarded upon application for Mouthpieces complete, or for Lids and Fastenings separately.

Makers of THOMAS & SOMERVILLE'S COKE-BREAKING MACHINE.
Sole Makers of WHITE'S PATENT AUTOMATIC GAS-VALVE.

Mr. JOHN WEST, M. Inst. C.E., Managing Director.

ILLUSTRATED CATALOGUE SENT UPON APPLICATION.

"THE METEOR."

NEW HIGH-POWER GAS-LAMP,

Westphal's Patent.

Gas Companies should hire these Lamps to their Consumers, and introduce them for Street Lighting as a rival to the Electric Light, as they do not get out of order, are most economical, and the Burner being a circular slit does not choke up.

Particulars and Prices Free.

HENRY GREENE & SONS,

SOLE CONSIGNEES FOR GREAT BRITAIN & COLONIES.

153 TO 155, CANNON STREET, LONDON BRIDGE, E.C.

OXYGEN, OXYGEN, OXYGEN.

(Extracted from the Atmosphere by **Brin's Patent Process.**)

40,000 cubic feet always in Stock.

Managers of Gas-Works supplied with Oxygen compressed in Weldless Steel Cylinders, for experimental purposes, &c., at special rates.

Estimates given for the erection of Oxygen Producers in Gas-Works, &c.

Managers of Gas-Works specially invited to inspect our Works.

The Manchester Oxygen (BRIN'S PATENT) Co., Ltd.,

GREAT MARLBOROUGH ST., OXFORD ROAD,

MANCHESTER.

Manufacturers and Compressors of all kinds of Gas.

WILLIAM INGHAM & SONS,

WORTLEY FIRE-CLAY WORKS,
Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing Adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT

MACHINE-MADE GAS-RETORTS.

J. & W. HORTON

ETNA WORKS,

SMETHWICK,

NEAR BIRMINGHAM

(Established 50 Years),

PATENTEES

AND

MANUFACTURERS

OF

IMPROVED GASHOLDERS AND BOILERS

and Manufacturers of every description of

Gas Apparatus,

Cast and Wrought Iron Tanks, Purifiers, Condensers, Scrubbers, Retort-Lids, Cross-Bars and Screws, Wrought-Iron Boilers for Stationary, Portable, and Marine Engines, Sugar Pans, Coolers, Clarifiers, Punts, Boats, Bridges, Girders, Roofs, Cisterns, Oil-Tanks, Melting-Pots, Crucibles, Salt-Pans, Arch and Range Boilers, and every description of General Ironwork.

Drawings, Specifications, and Estimates supplied.

SPENT LIMES NO LONGER WASTE PRODUCTS.

Under G. R. HISLOP'S PATENTS

All Spent Limes are most effectually, economically, and continuously recovered, and at from one-third to one-half the cost of New Lime. The results are a surprise to all who have inspected the process, and are entirely satisfactory to all now using it. Descriptive Pamphlet and Terms from Agents as under.

— REGENERATIVE SETTINGS OF RETORTS. —

Hislop's Patent Producer and Patent Charging Appliances offer advantages which are unapproachable, while in every other detail his Settings are confidently recommended as being the most inexpensive and effective possible.

Illustrated Pamphlet and Terms on application to J. E. FISHER, Stourbridge, Agent for England and Wales; to C. M. HAMILTON, Portland Place, Hamilton, Agent for Scotland and Ireland; and for all other Countries to the Patentee,

Geo. R. HISLOP, Gas Engineer, PAISLEY, N.B.

RETORT SETTINGS IMPROVED

BY ADOPTING

THE "NUGENT" & "ROBUS" SETTINGS.

ECONOMY WITH DURABILITY GUARANTEED.

HUNDREDS OF SETTINGS WORKING EMINENTLY SATISFACTORY.

Estimates and Particulars for every Description of Retort Extensions and other Work.

J. & H. ROBUS,

CONTRACTORS FOR GAS AND WATER WORKS,

20, BUCKLERSBURY, LONDON, E.C.

SPECIAL NOTICE.

G. J. PARKINSON & Co.,

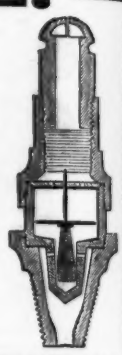
PENN STREET, CURZON STREET, BIRMINGHAM,

Have, from the 1st of January, 1890, commenced the supply of their

IMPROVED PATENT GAS GOVERNOR BURNER,

which cannot be surpassed by any other Burner in the market at the present time.

DO NOT MELT.



Please mention when required for Cassel Gas.

PRICE 14s. PER DOZEN. *Trade Terms and further particulars on application.*

They will be pleased to supply a sample of their IMPROVED PATENT STREET LAMP GOVERNOR, *free of charge*, to Gas Companies, Corporations, and Municipal Authorities on application.

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

MIDLAND DISTRICT OFFICE: 22, TEMPLE STREET, BIRMINGHAM—AGENT: A. C. SCRIVENER.

TELEGRAPHIC ADDRESS: "WIGAN BIRMINGHAM." TELEPHONE No. 200.

FIRE BRICKS,

LUMPS, TILES,

BLOCKS, &c.

Special Bricks for Intense Heats.

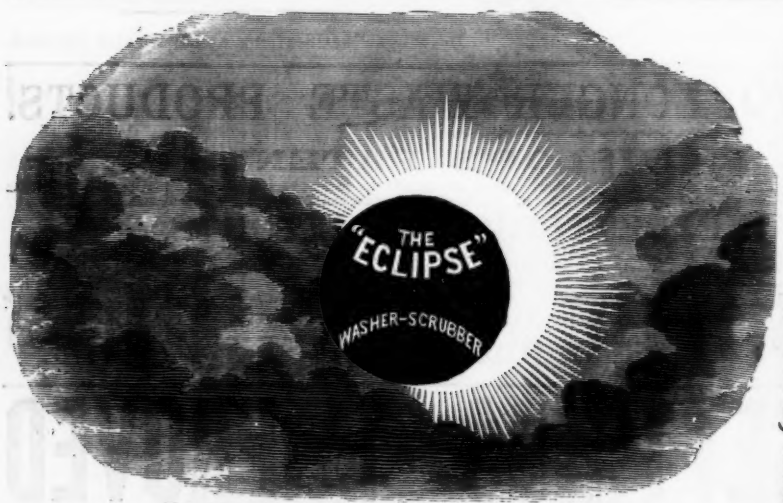
GAS RETORTS.

CASTINGS AND EVERY REQUISITE FOR GAS-WORKS.

MOBBERLEY & PERRY,

Fire-Brick Works, STOURBRIDGE.

☛ Retort Setters sent to any part of the Kingdom.



Laycock and Clapham's Patent.

The most efficient Machine known for extracting Ammonia and other Impurities from Coal Gas.

MACHINES with a total capacity of **42,500,000** cubic feet now working, and give great satisfaction.

LAST YEAR 11 Machines erected with a total capacity of **20,000,000** *feet.*

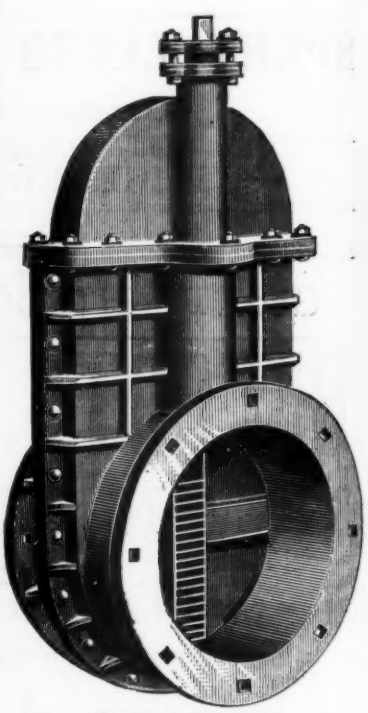
Send for Descriptive Catalogue to the Sole Makers:

Clapham Bros., Wellington, Nelson, & Market St. Works,

KEIGHLEY, YORKS.

Agents:—Mr. W. F. Roe, 52, Queen Victoria Street, E.C.
Mr. M. Schwab, 96, Deansgate, Manchester.
Mr. E. H. Wardwell, 10, Warren Street, New York, U.S.

SILVER MEDAL, Inventions Exhibition, 1885.



Clapham's Improved Internal Rack and Worm Valve, Gas-Mains, &c.

London: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, April 15, 1890.